Three Essays on Financial Restatements

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ABSTRACT

Three Essays on Financial Restatements

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This thesis consists of three essays. The first essay (chapter two) examines the impact of Canadian financial restatements on market quality. We find that Canadian financial restatements announced during 1997-2006 signal to market participants that expected future cash flows and their uncertainty are diminished and increased, respectively, and that they affect the market quality for restating firms. Abnormal returns are not only related to downward revisions in the consensus earnings forecasts of analysts but they become more negative for firms cross-listed in the U.S., and for revenue recognition and company-initiated restatements. Total residual volatility and its information-based permanent component from a GARCH model with an asymmetric effect and the adverse selection spread component increase following such announcements. Relative spreads and a spread-depth market-quality index not only increase (decrease) following such announcements but are lower (higher) for firms cross-listed in the U.S. Relative spreads (unlike the market-quality index) remain higher post-announcement, and are lower after the 2002 enactment of the Sarbanes-Oxley Act. Relative spreads, Amihud illiquidity estimates, synchronicity and volatilities increase for revenue recognition restatements.

The second essay (chapter three) examines the link between Canadian financial restatements and corporate governance. Using a novel, hand-collected dataset of corporate governance characteristics for a matched sample of 177 restating and 177 control firms, we find that Canadian firms are less likely to restate when they have bigger blockholder and management ownerships, audit committees with at least one director with financial expertise, a lower leverage ratio, and when they use a big 5 auditor. Restatement likelihood is not related to the proportion of unrelated directors, and whether the CEO is the Board Chair or belongs to the founding family. CEO, President, CFO and external auditor turnover are significantly higher for restating firms compared

to control firms over the two years following restatement announcements, but not for the turnover of the Board Chair, unrelated directors and audit committee members. The passage of Sarbanes-Oxley did not strength the disciplinary actions against management. After controlling for other determinants of turnover and restatement severity, the sensitivities of CEO, top executives and CFO turnovers to restatements do not increase in the post-SOX period. The number and proportion of unrelated directors, unrelated audit committee members and blockholder ownership increase in the two years post-restatement. The insignificant difference in the governance characteristics of restating and control firms post-restatement is consistent with the notion that restating firms attempt to move their governance to the norm and restore their reputation after restatement announcements.

The third essay (chapter four) examines the link between Canadian financial restatements and executive compensation. Using a novel, hand-collected dataset of executive compensation for a matched sample of 146 restating and 146 control firms, we do not find that firms are more likely to restate their financial statements when the sensitivity of total, vested and unvested option values, and in-the-money-stock options are higher for top executives, CEOs and CFOs. Incentives from equity, restricted stocks and long-term incentive payouts are not associated with the incidence of restatements for top executives, CEOs and CFOs. The total, vested and unvested option sensitivities are not related to the incidence of restatements due to accounting malfeasance. Except for the equity holdings of CEOs, restricted stock, equity holdings and long-term incentive payouts are not associated with the likelihood of restatements due to accounting malfeasance for top executives, CEOs and CFOs. The option sensitivities for top executives, CEOs and CFOs have no effect on the size of the restatements. The incentives from restricted stock are related to the size of restatements for top executives, CEOs and CFOs, and higher CFO equity holdings are related to larger restatements. Restating firms do not raise more long-term debt and equity capital in order to reduce the cost of external financing. Top executives and CEOs exercise more options during the first year restated when the magnitudes of the restatements are larger.

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TABLE OF CONTENTS

LIST OF TABLES viii

CHAPTER ONE 1

INTRODUCTION 1

CHAPTER TWO 7

FINANCIAL RESTATEMENTS BY CANADIAN FIRMS CROSS-LISTED AND NOT CROSS-LISTED IN THE U.S. 7

2.1 INTRODUCTION 7
2.2 HYPOTHESES 12
2.3 SAMPLE AND DATA 16
2.4 LIQUIDITY EFFECTS OF FINANCIAL RESTATEMENTS 18
2.4.1 Univariate Analysis 18
2.4.2 Multivariate Analysis of Changes in Market Liquidity 19
2.4.3 Empirical Results 20
2.5 ASYMMETRIC INFORMATION EFFECTS AROUND FINANCIALRESTATEMENTS 23
2.5.1 Behavior of Spread Components 23
2.5.1.1 Methodology 23
2.5.1.2 Empirical results 23
2.5.2 Behavior of (Un)informed Trader Arrivals and the Probability of Informed Trade 25
2.5.2.1 Methodology 25
2.5.2.2 Empirical results 25
2.6 IMPACT OF FINANCIAL RESTATEMENTS ON CONSENSUS EXPECTATIONS 27
2.6.1 Impact on Earnings Forecasts and Their Dispersion 27
2.6.1.1 Methodology 27
2.6.1.2 Empirical results 28
2.6.2 Impact on Abnormal Returns and Their Determinants 30
2.6.2.1 Methodology 30
2.6.2.2 Empirical results 31
2.6.3 Impact on Volatility of Residual Stock Returns 33
2.6.3.1 Methodology 33
2.6.3.2 Empirical results 34
2.6.4. Impact on Stock Return Synchronicity 35
2.6.4.1 Methodology 35
2.6.4.2 Empirical results 36
2.7 CONCLUSION 37

CHAPTER THREE 39

CANADIAN FINANCIAL RESTATEMENTS AND CORPORATE GOVERNANCE 39

3.1 INTRODUCTION 39
3.2 PRIOR LITERATURE 42
3.2.1 Financial Restatements and Corporate Governance 42
3.2.2 Financial Restatements and Turnover 44
3.2.3 Canadian Regulations Regarding Corporate Governance 45

3.3 SAMPLE AND DATA 46
3.4 GOVERNANCE CHARACTERISTICS AND RESTATEMENT INCIDENCE 49
3.4.1 Univariate Analysis 49
3.4.2 Correlations 51
3.4.3 Logistic Regression 51
3.5 FINANCIAL RESTATEMENTS AND TURNOVER 54
3.5.1 Univariate Analysis 54
3.5.2 Logistic Regressions 55
3.5.3 Univariate Analysis for Turnover Changes after SOX 57
3.5.4 Multivariate turnover analysis controlling for the impact of SOX 58
3.6 CHANGES IN GOVERNANCE FOLLOWING FINANCIAL RESTATEMENTS 61
3.7 CONCLUSION 62

CHAPTER FOUR 64

CANADIAN FINANCIAL RESTATEMENTS AND EXECUTIVE COMPENSATION 64

4.1 INTRODUCTION 64
4.2 PRIOR LITERATURE 67
4.3 HYPOTHESES 69
4.4 SAMPLE AND DATA 70
4.5 EXECUTIVE INCENTIVES AND THE INCIDENCE OF RESTATEMENT 73
4.5.1 Measurement of Executive Incentives 73
4.5.2 Univariate Analysis 76
4.5.3 Logistic Regression 78
4.5.4 Ordinal logistic regression 81
4.5.5 The impact of option sensitivity on the size of the restatement 82
4.6 OPTION EXERCISES 82
4.7 CONCLUSION 83

CHAPTER FIVE 85

CONCLUSION 85

REFERENCES 90

APPENDIX 132

Appendix 2.1 Categories for the reasons given for the financial restatements 132
Appendix 2.2 Spread decomposition and probability of informed 133
A2.2.1 Madhavan, Richardson and Roomans (1997) or MRR Model 133
A2.2.2 Glosten and Harris (1988) or GH Model 134
A2.2.3 Probability of Informed Trade (PIN) 134
Appendix 4.1 Categorization of Financial constraints by Hadlock and Piere (2010) 137

LIST OF TABLES

Table 2. 1. Summary descriptive statistics on the sample of Canadian financial restatements 98

Table 2. 2. Descriptive statistics for measures of liquidity around restatement announcements 100

Table 2. 3. Liquidity around restatement announcements for the subsamples 101

Table 2. 4. Multivariate analysis of changes in market liquidity for firms financially restating 102

Table 2. 5. The components of the bid-ask spreads 103

Table 2. 6. Results for the Easley, Kiefer, O'Hara and Paperman or EKOP (1996) Model 104

Table 2. 7. Summary statistics on the number of buyer- and seller-initiated trades 105

Table 2. 8. Financial analyst behavior around restatement announcements 106

Table 2. 9. The Average Abnormal Returns (AARs) and Cumulative Average Abnormal Returns (CAARs) 107

Table 2. 10. Cross-sectional regression results for abnormal returns 109

Table 2. 11. Component GARCH results around financial restatement announcements 110

Table 2. 12. Stock return synchronicity around restatement announcements 111

Table 3. 1. Descriptive statistics for restating firms 112

Table 3. 2. Summary statistics for sample and control firms 113

Table 3. 3. Correlation matrix 114

Table 3. 4. Logistic regression of the likelihood of restatement 115

Table 3. 5. Turnover for sample and control firms 116

Table 3. 6. Logistic regression for management and auditor turnover 117

Table 3. 7. Descriptive statistics for restating firms and control firms by SOX period 118

Table 3. 8. Logistic regressions for management turnover considering the effects of SOX 119

Table 3. 9. Logistic regression for management turnover considering the effects of SOX and severity of restatements 120

Table 3. 10. Governance variables for sample and control firms before and after the restatements 121

Table 4. 1. Descriptive statistics for restating firms 122

Table 4. 2. Summary statistics for sample and control firms 124

Table 4. 3. Summary compensation statistics for sample and control firms 125

Table 4. 4. Logistic regression of the likelihood of restatement 127

Table 4. 5. Ordinal logistic regression models 129

Table 4. 6. The impact of option sensitivity on size of restatements 130

Table 4. 7. Option exercises by executives 131

CHAPTER ONE

INTRODUCTION

When a firm's previous reported financial results contain errors, there is the need to restate the financial statements. Financial restatements by publicly traded companies have increased significantly in recent years both in the U.S and Canada. According to the United States Government Accountability Office (formerly the United States General Accounting Office or GAO), restatements due to accounting irregularities grew about 145 percent from January 1997 to June 2002, and 67 percent from 2002 to September 2005. In Canada, the number of firms listed on the Toronto Stock Exchange (TSX) that restated their financial results due to irregularities increased from 1 in 1997 to 56 in 2006. One example of a financial restatement by a Canadian firm is Nortel Networks Corporation. On October 23, 2003, Nortel announced that it intended to restate its financial results for 2000, 2001 and 2002 and the first and second quarters of 2003, as a result of its comprehensive asset and liability review. The restatements, which were primarily related to the elimination of liabilities of approximately US $900 million, were partially offset by a reduction in net deferred income tax of approximately US$160 million.

Firms can restate their financial statements for reasons such as discontinued operations, stock splits, merger and acquisitions, changes in reporting currency or changes in accounting principles. These types of restatements represent normal corporate activities and should not have any material impact on firm value due to accounting irregularity. In this thesis, we only study the financial restatements due to accounting irregularities according to the definition of the GAO (2002, 2006); i.e., "accounting irregularity is an instance in which a company restates its financial statements because they were not fairly presented in accordance with generally accepted accounting principles (GAAP). This would include material errors and fraud".

In this thesis, we address three topics related to financial restatements. The second chapter (first essay) examines the event impact on returns, risks and market quality due to financial restatement disclosures. Financial restatements potentially may send two signals to market

participants. The first signal deals with the firm's future earnings prospects and the second signal deals with the quality of the firm's management team and information systems. If the second signal is not material, then there should be a one-time adjustment in price and the earnings forecasts of analysts with no change in the uncertainty of future cash flows (as reflected in the permanent component of return volatilities and spreads, or the dispersion in the forecasts of analysts). If the second signal is also material, then there also should be a change in the uncertainty of future cash flows.

In contrast to the impact on equity prices of restatement announcements, the impacts on market quality (such as risk, liquidity, volatility and informational asymmetry) have received little attention in the literature. To address this shortcoming, we analyze the changes in the following measures around restatement announcements: (i) liquidity from a multivariate perspective; (ii) the asymmetric spread component, (iii) (un)informed trader arrival rates and the probability of trading with an informed trader, (iv) the temporary and permanent components of the volatilities of residual returns; and (v) the synchronicity of stock prices. We also assess the impact of being cross-listed or of the introduction of the Sarbanes-Oxley Act in 2002 on restatement announcements.

Our findings support the hypothesis that financial restatements send two information signals to market participants. The first signal is that the future earnings prospects of the restating firms are diminished. Consistent with the literature, Canadian restatements are associated with significant downward revisions in the consensus forecasts of earnings and significant negative abnormal returns. The second signal is that the uncertainty of future cash flows of the restating firms due to increased informational asymmetry has increased. We find that relative quoted and effective spreads increase in the restatement announcement window and remain elevated after the restatement announcements. Both spread measures are lower for firms that are cross-listed in the U.S., and for financial restatement announcements after the enactment of the Sarbanes-Oxley Act in 2002. We also find that the adverse selection and order processing components of the spread

increase and decrease, respectively, following restatement announcements. Both uninformed and informed trading increase following restatement announcements. The probability of informed trading only increases significantly for cost or expense restatements. The results also indicate that both the long-run component and total volatility (jump risk) increases are associated with restatement announcements. Using the R^2 from a basic return-generating model, we find higher levels of synchronicity following the restatement announcements, and especially for the securities-related subsample.

In the third chapter (second essay), we examine the relation between corporate governance characteristics and the likelihood of restatement. We are interested in determining whether certain governance characteristics are associated with the incidence of financial restatements. Good corporate governance is central to the effective and efficient operation of the corporation and it plays a significant role in protecting shareholders' interests and maximizing shareholder value. There have been significant developments in corporate governance following corporate frauds, such as the passage of the Sarbanes-Oxley Act of 2002 in the U.S. and approval of National Instrument 58-101, *Disclosure of Corporate Governance Practices*, and National Policy 58-201, *Corporate Governance Guidelines* in Canada. However, the literature provides mixed results on the consequences of financial fraud.

We build on the literature by examining the consequences of restatement announcements on unrelated directors, audit committees, and external auditors in addition to top executives and CFOs. In addition, Canada provides an ideal alternative laboratory for examining the impact of corporate restatements on corporate governance given its similarities and differences with the U.S. Both countries share similar legal, institutional and regulatory environments, including corporate governance mechanisms and minority shareholder protections but not regulatory enforcement. However, Canadian public companies differ from their U.S. counterparts in that the percentages of Canadian public firms with controlling shareholders (concentrated ownership), families as the ultimate controlling shareholders, and issued restricted or subordinated voting shares and

pyramidal structures are higher (e.g., Gadhoum *et al.*, 2005; Gadhoum, 2006; King and Santor, 2008).

Our findings suggest that the likelihood of restatement is lower when a firm's audit committee includes at least one director with financial expertise. In addition, firms are less likely to restate when they have bigger blockholder and management ownerships, a lower leverage ratio, and when their external auditor is one of the big 5 auditors. However, there is no evidence that firms are more likely to restate when they have a lower proportion of unrelated directors, or their CEO is also the Board Chair or belongs to the founding family. Given the negative impact of financial restatements we find in the first essay, we are also interested in the consequences of financial restatements to the executives at restating firms. We find that the market punishes the firms misstating their financial results since the CEO, President, CFO and external auditor turnovers are significantly higher for restating firms compared to control firms within the two years following restatement announcements. However, we do not find that restatement announcements are related to higher turnovers of the Board Chair, unrelated directors and audit committee members.

Because our sample covers 1997-2006, it provides a natural experiment to examine whether the passage of the Sarbanes-Oxley Act (SOX) of 2002 enhances the accountability of management for financial reporting. The results suggest that the market does not punish the firm more severely after the passage of SOX since the sensitivity of CEO, top executives and CFO turnovers to restatements do not increase in the post-SOX period.

Given all the consequences for restating firms, we ask the next question: did those firms try to improve their governance to restore their reputations or to regain the confidence of their investors? The results indicate that restating firms attempt to improve their governance since the number and proportion of unrelated directors and unrelated audit committee members as well as blockholder ownership increase by two years after the restatement announcements. In addition, the

governance characteristics of restating firms become not significantly different from control firms following the restatement announcements.

Prior studies on stock-based compensation can be categorized into two streams. One stream of the literature argues that using equity compensation aligns the interests of managers and shareholders so that the agency costs are reduced (Smith and Watts, 1992; Baber *et al*., 1996; Core *et al*., 2003). Another stream of the literature argues that equity compensation provides incentives for managers to manipulate financial results to gain short-run benefits (Bar-Gill and Bebchuk, 2003; Jensen, 2005; Goldman and Slezak, 2006). We are interested in the reason why firms misreport their financial results from the perspective of stock compensation.

In the fourth chapter (third essay), we addresses the link between executive compensation and the likelihood of financial restatements. We extend the previous studies by examining whether the incentives from stock options, restricted stocks, equity holdings and the long-term incentive payouts for top executives (including CEOs and CFOs) are associated with a higher likelihood of restatement. The results show that firms are not more likely to restate their financial statements when the sensitivity of total, vested and unvested option values and values of in-the-money stock options are higher for top executives, CEOs and CFOs. Incentives from equity, restricted stocks and long-term incentive payouts are not associated with the incidence of restatements for top executives, CEOs and CFOs. We find that total, vested and unvested option sensitivities are not related to the incidence of restatements due to accounting malfeasance, i.e., prompted by regulators or auditors. Except for the equity holdings of CEOs, restricted stock, equity holdings and long-term incentive payouts are not associated with the likelihood of restatements due to accounting malfeasance for top executives, CEOs and CFOs. The results also suggest that option sensitivities for top executives, CEOs and CFOs have no effect on the size of the restatements. In addition, we do not find any evidence that firms raising more long-term debt and equity capital are more likely to misreport financial results in order to reduce the cost of external financing.

However, top executives and CEOs exercise more options during the first year restated when the magnitudes of the restatements are larger.

CHAPTER TWO

FINANCIAL RESTATEMENTS BY CANADIAN FIRMS CROSS-LISTED AND NOT CROSS-LISTED IN THE U.S.

2.1 INTRODUCTION

The regulation of financial reporting by public companies is shaped principally by three interrelated considerations of materiality, accuracy and cost. In an efficient market, stock prices and their return moments (e.g., mean and standard deviation) reflect the available information set (e.g., Fama, 1991; Ross, 1989), including misinformation or misrepresentations that are currently unknown to market participants. When a financial restatement or other corrective disclosure occurs to correct previously reported information that was inaccurate or misleading and unforeseen by firm outsiders, we expect such disclosures to result in event risk which may affect prices, market microstructure (including spreads and (un)informed trading), and the return moments (and their components) of the restating public company. The magnitudes and directions of these effects are expected to depend on the materiality of the correction (as shown by, e.g., Kryzanowski (1978, 1979) for expected returns for material corporate disclosures, including misinformation, in a Canadian context).

The evidence reported herein supports the conjecture that financial restatements affect the market quality (as reflected in spreads and/or depths) for restating firms and that they send two signals to market participants. The first signal deals with the firm's future earnings prospects and the second signal deals with the quality of the firm's management team and information systems. If the second signal is not material, then there should be a one-time adjustment in price and the earnings forecasts of analysts with no change in the uncertainty of future cash flows (as reflected in the permanent components of return volatilities and spreads, or the dispersion in the forecasts of analysts). If the second signal is also material, then there also should be a change in the perceived uncertainty of future cash flows associated with a financial restatement.

A body of research (reviewed in the next section) that is primarily focused on U.S. firms analyzes the equity price impact of financial restatements by publicly traded firms. This literature finds a negative relation between abnormal returns estimated using traditional return-generating models and financial restatement announcements, with abnormal returns ranging from -4% to -12% (e.g., Dechow *et al.*, 1996; Turner *et al.*, 2001; Anderson and Yohn, 2002; Wu, 2002; Palmrose *et al.*, 2004). In contrast to the impact on equity prices of restatement announcements, the impacts on risk, liquidity, volatility and informational asymmetry have received little attention in the literature. Notable exceptions include the studies by Anderson and Yohn (2002) and Palmrose *et al.* (2004) who do and do not respectively find a significant increase in spreads for revenue-recognition restatements.

To our knowledge, no published studies examine changes in the following measures around restatement announcements: (i) liquidity from a multivariate perspective; (ii) the asymmetric spread component, (iii) (un)informed trader arrival rates and the probability of trading with an informed trader, (iv) the temporary and permanent components of the volatilities of residual returns; and (v) the synchronicity of stock prices. Furthermore, no study has examined financial restatements from a Canadian perspective or examined the impact of being cross-listed or of the introduction of the Sarbanes-Oxley Act (SOX) in 2002 to further test the robustness of inferences drawn from primarily U.S. restatement announcements.

To address these issues, this paper examines a large sample of financial restatement announcements by Canadian firms over the period of 1997-2006 whose stocks are listed on the TSX. This time period coincides with the time period included in the GAO database to facilitate cross-market comparisons and embeds the enactment of SOX in 2002. Furthermore, about one-third of our sample consists of firms that are cross-listed in the U.S.[1] Thus, our study contributes to the existing literature by analyzing various previously unexplored aspects of market quality,

[1] Findings suggest that being cross-listed (Charitou *et al.*, 2007) or becoming cross-listed (Leil and Miller, 2008) is associated with better corporate governance.

informational asymmetry and uncertainty around restatement announcements for domestic-only and cross-listed firms. We also assess the impact on spreads of the enactment of SOX in 2002 that introduced sweeping changes to the corporate governance and disclosure obligations of domestic companies publicly traded on U.S. markets. While adherence to SOX was voluntary for foreign firms with fiscal years prior to July 15, 2006, Anand *et al.* (2012) find that Canadian firms voluntarily adopted U.S. standards (SOX) rather than Canadian guidelines, regardless of their cross-listed status and ownership structure. This was based on an analysis of the adoption of corporate governance standards by firms included in the S&P/TSX Composite Index over the five-year period 1999-2003.

Our univariate findings are consistent with U.S. findings by Anderson and Yohn (2002) in that relative effective (and extended to quoted) spreads increase for Canadian restatement announcements associated with revenue recognition problems. We extend examinations of U.S. restatements to depths and find that market depths decrease (but only significantly based on the medians) for such restatement announcements. When we control for spread determinants already identified in the literature (such as price, volume and volatility) in a multivariate setting, we find that relative quoted and effective spreads increase in the restatement announcement window for the full sample and remain elevated post-restatement announcement. We also find that both spread measures are lower as expected for the one-third of our sample that are cross-listed in the U.S., and for financial restatement announcements after the enactment of SOX in 2002. Using the market quality index suggested by Bollen and Whaley (1998) to capture the effects of financial restatements on both dimensions of liquidity, we find market quality is lower in the restatement announcement window.

We investigate the links between restatements and informativeness of stock prices by examining the behavior of the spread components around the announcements using the decomposition models of Madhavan *et al.* (1997) and Glosten and Harris (1988). We find that the adverse selection and order processing components of the spread increase and decrease,

respectively, following restatement announcements. These changes in the full sample are mainly attributable to the revenue recognition, and cost or expense subsamples. We also find increases in both uninformed and informed trading following restatement announcements. However, we find no effects of restatement announcements on the probability of new information events as well as on the probability of informed trade (PIN) based on the market microstructure sequential trade model developed by Easley *et al.* (1996). This is not inconsistent with the information asymmetry hypothesis that restatement announcements lead to increased information asymmetry. The reason is that the arrival rates of informed and uninformed traders increase significantly in such a manner that with an unchanged probability of future information events that the PIN does not change significantly. However, we find that the probability of informed trading increases significantly for cost or expense restatements. This suggests an increase in information asymmetry for such restatements.

Duarte and Young (2009) show that the PIN component related to asymmetric information is not priced, while the PIN component of illiquidity that is unrelated to information asymmetry explains the relation between the PIN and expected returns. We find that buy orders are more volatile than sell orders and the correlations between buyer- and seller-initiated trades are positive for both the pre- and post-restatement periods except for the fifth percentile of the mean. Therefore our results provide supportive evidence for Duarte and Young (2009) since the PIN model developed by Easley *et al.* (1996) cannot explain the pervasive positive correlation between buy and sell orders and the high variances found in the data.

We perform analysis of the effects of restatement announcements on the earnings forecast revisions of analysts. Consistent with Palmrose *et al.* (2004), we find a significant downward revision in the consensus forecasts of earnings by analysts after restatement announcements, which suggest that these announcements have a material unanticipated component from the perspective of financial analysts. We find no significant changes in either analyst following or the dispersion of their forecasts of earnings.

Consistent with the literature, we find a significant negative abnormal return (AR) associated with Canadian restatement announcements using a dual-beta market model. The cross-sectional regression analysis indicates that more negative Ars are associated with firms cross-listed in the U.S., and for restatements involving revenue recognition problems and those initiated by the company as they signal negative information about a firm's future prospects and/or earnings quality. Ars are significantly and positively related to the revisions in the earnings forecasts of analysts over the restatement announcements, which implies that earnings revisions are a driver of the Ars and that the restatements are a driver of the revisions in the earnings forecasts of analysts. We find no evidence that changes in illiquidity or the sizes of the restating firms help to explain abnormal returns.

We examine the impact of corporate restatement announcements on the information-based permanent or long-run component and the transitory noise-trading-induced or short-run component of the residual volatility of returns. The full residual volatility model uses the component GARCH or CGARCH model of Engle and Lee (1993, 1999) with (out) an asymmetric effect on residual volatility of shocks to returns, as in Glosten *et al.* (1993). The results indicate that increases in both the long-run component and total volatility (jump risk) are associated with restatement announcements.

When combined with the liquidity findings, these volatility results provide support for the hypothesis that restatement announcements lead to deterioration in market quality. Based on the Amihud *et al.* (1986, 2001) argument that greater liquidity should lower the cost of capital for a firm, we surmise (but do not test) that restatement announcements increase the firm's cost of capital.

Our study also contributes to the literature that examines measures of the incorporation of firm-specific information into security prices. Using the R^2 from a basic return-generating model, we find higher levels of synchronicity (i.e., relatively less firm-specific information being impounded into stock prices) following the restatement announcements, and especially for the

securities-related subsample. While Asbaugh-Skaife *et al*. (2006) suggest that the proportion of zero returns is a better measure of synchronicity, we find that this metric increases significantly in the post restatement period only for firms associated with revenue recognition problems. These results provide evidence that the zero-return metric is a competitive alternative measure of the relative contribution of firm-specific information to the variation of stock returns.

The remainder of this chapter is organized as follows. The hypotheses are developed in Section 2.2. Section 2.3 discusses the data and our sample selection. The methodology and results for the impact of restatement announcements are presented and analyzed in sections 2.4, 2.5 and 2.6 for their impacts on liquidity, asymmetric information and consensus expectations, respectively. Section 2.7 concludes the paper.

2.2 HYPOTHESES

It is well established in the literature that shareholders in firms who announce earnings restatements earn negative abnormal returns. The United States Government Accountability Office (formerly the United States General Accounting Office or GAO) reports that the market capitalization of restating companies decreased by $100 billion and by $36 billion in the days surrounding restatement announcements in 2002 and 2006, respectively. Restatements involving cost or expense-related issues produced greater dollar losses in 2002, while restatements involving revenue issues, financial report fraud, and/or accounting errors led to greater market losses in 2006. Restatements are associated with an increase in the firm's cost of equity (Hribar and Jenkins, 2004) and debt (Graham *et al*., 2008). Li and Zhang (2006) find strong evidence of profitable insider trading surrounding restatement announcements, especially prior to the passage of the Sarbanes-Oxley Act.

Two papers obtain mixed results for changes in bid-ask spreads around restatement announcements. Anderson and Yohn (2002) find a significant increase in spreads for revenue-recognition restatements. Palmrose *et al.* (2004) do not find significant spread increases for their

full and revenue-recognition samples.[2] We extend their analysis by examining other proxies of market liquidity (such as effective spreads, dollar volumes and dollar depths) and a measure of market quality that examines the net effects on spreads and depths. Our first hypothesis, stated in its alternative form, is as follows:

H_A^1 : Market liquidity and quality decreases following the restatement announcements.

Financial restatements can impact both the permanent (adverse selection) and transitory (order processing) spread components. The permanent component will decrease (increase) if restatement announcements reduce (increase) informational asymmetry, and the temporary component will decrease (increase) if restatement announcements increase (decrease) trading volume. We expect increases and decreases in respectively the permanent and transitory components post-announcement. Therefore, the second hypothesis, stated in its alternative form, is as follows:

H_A^2 : The permanent and temporary spread components respectively increase and decrease following the restatement announcements.

We further analyze the changes in information asymmetry around restatement announcements by examining the probability of informed trading (PIN) using the model developed by Easley *et al.* (1996). The expected effect of restatement announcements on PIN is indeterminate since it depends on changes in the probability of information events (α) and in the arrival rates of both informed and uninformed traders (μ and ε). While a reduction in α is expected as analysts turn private information into public information by attracting more analysts to the announcing firms (Easley *et al.*, 2001), an increase in α is expected if analysts fulfill their role of creating new private information (Easley *et al.*, 1998). The effect of changes in the arrival

[2] Anderson and Yohn (2002) examine time-weighted median absolute quoted spreads, while Palmrose *et al.* (2004) examine relative quoted spreads (i.e., the closing absolute quoted spread divided by the share price on day -2 relative to the restatement announcement).

rates (μ and ε) depends upon their net effect on the pool of active (un)informed traders and their trade behaviors. Therefore, the third hypothesis, stated in its alternative form, is as follows:

H_A^3: The change in the probability of informed trading following the restatement announcements is indeterminate.

Palmrose *et al.* (2004) interpret a downward revision in the mean and an increase in the dispersion of the earnings forecasts of analysts following restatements as evidence of diminished firm prospects. In contrast to Anderson and Yohn (2002) and Wu (2002) who find a decrease in the response of prices to earnings disclosures following restatements, Wilson (2008) finds that concerns about post-restatement earnings are only transitory, and investors regain confidence within a short period of time following restatements. If financial restatement announcements are totally unexpected events, they should result in downward revisions in the consensus expectations about the prospects of announcing firms and indeterminate changes in the dispersion of such expectations depending on whether the announcements cause a divergence or convergence of perceptions on what has happened to informational asymmetry. Accordingly, our fourth hypothesis, stated in its alternative form, is:

H_A^4: The consensus earnings forecasts of analysts decline and the changes in the dispersion of their forecasts are indeterminate after financial restatement announcements.

Callen *et al*. (2006) conjecture that the three factors that may affect the market reaction to financial restatements are the downward revision of future cash flow expectations, weakness in the accounting information system and opportunistic managerial behavior as evidenced by reporting higher profits than warranted. They find that market reactions are significantly negative when all three factors are present, and are not significant when alone or more factors are absent. . Unlike Callen *et al.* (2006), we exclude restatements due to changes in accounting principles because we are only interested in the restatements that are associated with accounting fraud or errors. We argue that Canadian restatement announcements, similar to those in the U.S., lead to a

lowering of consensus expectations about firm prospects, which in turn, are manifested in negative abnormal returns (Ars) that depend upon the reasons provided for the restatements. To illustrate, Anderson and Yohn (2002) argue that restatements due to revenue recognition problems are perceived as being more intentional than restatements due to expense problems and more important because revenue generation is the key to firm value. Ertimur *et al.* (2003) find that investors react differently to revenue and expense surprises because revenue surprises are more persistent, easier to manage and less noisy than expense surprises.[3] Therefore, the fifth hypothesis, stated in its alternative form, is as follows:

H_A^5: Significant negative abnormal returns are associated with restatement announcements, with those involving recognition problems being more negative.

Studies for the impacts of other corporate events, such as stock splits (Dubofsky, 1991; Kryzanowski and Zhang, 1993; Desai *et al.*, 1998), find that volatility changes follow that event. For example, Desai *et al.* (1998) find that both the transitory and permanent components of volatility increase after the split, which is consistent with an increase in the number of both informed and noise traders following the split. To our knowledge, no such study assesses the impact of restatement announcements on the components of volatility. Previous studies find that return variances are positively related to bid-ask spreads (Amihud and Mendelson, 1987), so we propose the sixth hypothesis, stated in its alternative form, as:

H_A^6: Both the transitory and permanent components of volatility increase following restatement announcements.

Morck *et al*. (2000) and Durnev *et al*. (2003) suggest that stock price synchronicity or the extent to which stock prices move together reflects the firm-specific information impounded in stock prices. Although different measures of synchronicity exist in the literature (Jin and Myers,

[3] Jegadeesh and Livnat (2006) also find significant abnormal returns after earnings announcements for stocks that are involved with large revenue surprises.

2006), the most popular is R^2. Higher values of R^2 all else held equal indicate lower idiosyncratic volatility (Roll, 1988). Durnev *et al*. (2003) find that lower firm-specific (idiosyncratic) price variation as measured by a higher R^2 is associated with prices that are less informative about future earnings. Asbaugh-Skaife *et al*. (2006) find that stock price synchronicity measured by R^2 does not consistently capture the variation of firm-specific information for international markets. They provide evidence that a zero-return metric based on Lesmond *et al.* (1999) is a better measure of firm-specific information embedded in stock prices.[4] Thus, a bigger proportion of zero returns implies that relatively less firm-specific information is impounded into stock prices (i.e., greater return synchronicity).

Restatement announcements are major information events that signal that the firm-specific information embedded in pre-restatement prices was of lower reliability (or quality) for a variety of reasons, and are more likely to have had an adverse impact on price synchronicity. Thus, we expect price synchronicity to increase after the restatement announcements. Therefore, our seventh and final hypothesis, stated in its alternative form, is:

H_A^7 : Stock price synchronicity increases after financial restatement announcements.

2.3 SAMPLE AND DATA

Restatement announcements of Canadian companies are identified using searches of Lexis-Nexis News Wires for the ten-year period from January 1997 to December 2006. Key word searches are performed using "restate," "restates," "restated," "restating," or "restatement" as well as other variations such as "adjust" and "amend" and "revise" within 50 words of "financial statement" or "earnings." Restatement announcements are excluded if they result from

[4] Based on the argument that the marginal investor will only trade if the value of the information signal exceeds transaction costs, Lesmond *et al.* (1999) use the proportion of zero-return trading days over a year as being indicative of the cost of trading.

discontinued operations, stock splits, stock dividends, mergers and acquisitions,[5] changes in business segment definition, changes made for presentation purposes, and changes in currency of reporting (for example, converting from Canadian to U.S. dollars). Restatements due to changes in accounting policy also are excluded as a general rule because they represent normal corporate activities which do not involve accounting fraud or errors.[6] Restatements are classified into one or more of the nine categories described in Appendix 2.1 based on the GAO (2002, 2006) classification. The restatement initiator is also identified for each announcement.

Our initial sample consists of 365 restatement announcements. Restatements are eliminated for 134 firms listed on the TSX Venture Exchange, Alberta Stock Exchange, Vancouver Stock Exchange, and Canadian Dealing Network due to the unavailability of intraday data, six firms with insufficient daily stock returns and closing prices in the Canadian Financial Markets Research Center (CFMRC) database, four firms with simultaneous trading halts and subsequent delistings, and those firms with multiple restatement announcements during the 250 trading days used for analysis purposes. This results in a final sample of 210 restatements by 193 firms. Daily S&P/TSX Composite Index (formerly TSE 300 Composite Index) returns are also drawn from the CFMRC database. The daily one-month Canadian T-bills rate (risk-free proxy) is collected from the Canadian Socio-Economic Information Management System (CANSIM II). Quoted closing mid-spreads are used as the proxies for any missing closing prices in the tests requiring returns.

Intraday data obtained from the TSX Trade and Quote database during exchange hours of 9:30 to 16:00 are included. Trades that are opening trades, delayed delivery, cancellation or have

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[5] For example, a firm restates its financial statements after completion of a merger where the merger was accounted for as a pooling of interests.

[6] We exclude firms adopting new accounting recommendations by the Canadian Institute of Chartered Accountants (CICA), Financial Accounting Standards Board (FASB) or the Emerging Issues Task Force (EITF). However, we include restatement announcements resulting from SEC clarifications of revenue recognition in financial statements (SEC Staff Accounting Bulletin No. 101) and lease accounting for operating lease (Feb.7, 2005, letter from SEC's Chief Accountant to American Institute of Certified Public Accounts clarifying SEC staff's interpretation of certain accounting issues and their application under GAAP relating to operating leases). To our knowledge, there are no restatements resulting from changes in Canadian regulations.

special terms are excluded. To eliminate potential errors, trades with trade-by-trade returns greater than 50% and quotes with bid-ask spreads greater than 30% of their mid-spreads are also excluded.

Summary characteristics for the restatement announcements in the final sample differentiated by the reason for the restatement, the party initiating the restatement, industry groups based on primary two-digit SIC codes and distribution of restatements by year are reported in Table 2.1. Because some firms report multiple reasons for their restatements, the total number of reasons reported in Panel A exceeds the total sample size. Cost or expense is the most common reason (25.7%), followed by other (21.3%) and revenue recognition (16.5%). The frequencies differ from those reported for U.S. restatements (e.g., Anderson and Yohn, 2002; Palmrose *et al.*, 2004; Hribar and Jenkins, 2004), where revenue recognition is the largest restatement category. Based on Panel B of Table 2.1, the initiators are unknown for 42.9% of the reinstatements, followed by company-initiated restatements for 33.3% of the reinstatements. Based on Panel C of Table 1, 31% of the firms are in manufacturing, followed by 24.8 % and 18.6% of the firms in mining and services, respectively. Based on Panel D of Table 2, the number of restatements has increased significantly from one in 1997 to 56 in 2006.

[Please insert table 2.1 about here.]

2.4 LIQUIDITY EFFECTS OF FINANCIAL RESTATEMENTS

2.4.1 Univariate Analysis

We examine various liquidity measures to test the first hypothesis that market liquidity is expected to decrease following restatement announcements. The relative quoted spread is measured as the quoted spread divided by the spread midpoint, and the relative effective spread is

measured as the effective spread divided by its midpoint.[7] Dollar volume is share volume times the corresponding price for each trade. Dollar depth is the sum of the ask price times ask size and the bid price times bid size for each quote. Chung *et al*. (2010) argue that corporate governance can affect both the spread and depth simultaneously, and therefore a measure that captures both dimensions of liquidity is required. They use a measure called the market quality index that was proposed by Bollen and Whaley (1998). This measure is defined as the ratio of the average quoted depth to the relative quoted spread. We also use this market quality index.

Since these measures of illiquidity rely on the availability of microstructure data, Amihud (2002) proposes a measure of illiquidity that is readily available over long periods for most markets, called *ILLIQ*. It is equal to the average ratio of the daily absolute return to its daily dollar volume over some multi-day period. We employ this measure of illiquidity to examine the price impact of order flow.

2.4.2 Multivariate Analysis of Changes in Market Liquidity

The literature reports that spreads are positively related to volatility and negatively related to price and volume (e.g., Copeland and Galai, 1983). Thus, we estimate the following pooled cross sectional time series regression to isolate the changes in spreads due to financial restatements from other influences:

$$\begin{aligned} LnSpread_{it} \text{ or } LnMarket\_quality\_index_{it} = {} & \beta_0 + \beta_1 Ln\,\mathrm{Price}_{it} + \beta_2 LnVolume_{it} \\ & + \beta_3 LnVolatiltiy_{it} + \beta_4 Crosslist_i + \beta_5 Sarbanes_i \\ & + \beta_6 Post-restatement_i + \beta_7\,\mathrm{Re}state_i + \varepsilon_{it} \end{aligned} \quad (2.1)$$

In (2.1), t=1 represents the pre-restatement period [-55, -10], t=2 represents the post-restatement period [10, 55] and t=3 represents the three-day event window [0, 2]. $LnSpread_{it}$ is the natural logarithm of average relative quoted or effective spreads for stock i during window t.

[7] We also examine the quoted spread which is the difference between the ask and bid prices, and the effective spread which is defined as twice the absolute value of the difference between the trade price and the prevailing quote midpoint. Significant results are reported hereafter in the footnotes.

$LnMarket\_quality\_index_{it}$ is the natural logarithm of the market quality index for stock *i* during window *t*. $LnPrice_{it}$, $LnVolume_{it}$ and $LnVolatility_{it}$ are the natural logarithms of average daily closing prices, daily trading share volumes and standard deviations of daily returns for stock *i* over each of the three windows, respectively. The dummy variable $Crosslist_i$, which is equal to one if stock *i* is cross-listed and zero otherwise, is included since one third of our sample firms are cross-listed in the U.S. $Sarbanes_i$ is a dummy variable that is equal to one if the financial restatement for firm *i* is announced after the enactment of the Sarbanes-Oxley Act on July 30, 2002 and zero otherwise. $Post\text{-}restatement_i$ is a dummy variable that is equal to one in the post-restatement announcement period and zero otherwise. *Restate* is a dummy variable that is equal to one in the three-day event window [0, 2] and zero otherwise.

2.4.3 Empirical Results

The estimates of the spreads (quoted and effective), quoted dollar depths, dollar volumes, the Amihud (2002) illiquidity measure and market quality index around the restatement announcements for the full sample are reported in Table 2.2. The pre- and post-restatement periods each consist of 46 trading days ending ten days before and starting ten days after the announcement, respectively.[8] For the entire sample, the mean (median) relative quoted spread increases insignificantly from 0.0359 (0.0204) dollars to 0.0366 (0.0209) dollars. This is consistent with the univariate findings of Anderson and Yohn (2002) and Palmrose *et al.* (2004) who find that quoted spreads do not change significantly around undifferentiated restatement announcements. Similarly, the mean relative effective spreads do not increase significantly in the

[8] We also examine the different illiquidity measures in the seven-day window [-3, 3] used by Anderson and Yohn (2002) and for the three-day window [0, 2]. The univariate results are similar to those reported below.

post-restatement period.[9] As we subsequently show later in this section, these univariate results are not robust because they do not control for other spread determinants.

The mean (median) traded volume in thousands of dollars increases insignificantly from 3932.67 (207.20) to 4202.99 (199.96). The mean (median) market depth decreases from 44,398.55 (25,520.20) to 42,998.51 (25,568.57) dollars following restatement announcements, and only the median change is significant based on the Wilcoxon signed rank test. The average Amihud illiquidity increases in the post-restatement period, and only the median is weakly significant (p-value = 0.07). The median market quality index decreases insignificantly following restatement announcements.

[Please insert table 2.2 about here.]

The liquidity results based on the reasons for restatement are only reported in Table 2.3 for the four subsamples with significant changes.[10] The relative quoted and effective spreads increase significantly only for revenue recognition restatements in the post-announcement period, which is consistent with the findings of Anderson and Yohn (2002) and not Palmrose *et al.* (2004).[11] The subsample results for quoted dollar depths suggest that the decrease in median depths for the full sample is mainly due to a significant decrease in median depths for revenue-recognition restatements (median = -52.14, Wilcoxon p-value = 0.04). Revenue-recognition restatements are also the only subsample with a weakly significant change (increase) in market illiquidity *ILLIQ* (mean = 0.309, t-stat = 1.68).

[Please insert table 2.3 about here.]

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[9] Based on untabulated results, the mean quoted and effective spreads do not change significantly in the post-restatement period. The median quoted and effective spreads decrease significantly based on the Wilcoxon signed rank test.

[10] The dollar volume and market quality index results for subsamples are not reported as none of them exhibit a significant change after the restatement announcements.

[11] Based on untabulated results, the mean and median quoted and effective spreads only decrease significantly for three of the subsamples of restatements (i.e., cost or expense, reclassification, and other).

The multivariate regression estimates for relative quoted and effective spreads are reported in Table 2.4. Consistent with the literature, the estimated coefficients for $LnPrice_{it}$, $LnVolume_{it}$ and $LnVolatility_{it}$ have their predicted signs and are highly significant (< 1% level) for both spread measures. All of the estimated coefficients of the dummy variables are highly significant with their predicted signs. The coefficient estimates for the $Crosslist_i$ and $Sarbanes_i$ dummy variables are negative and highly significant for both spread measures. This implies that being cross-listed and the introduction of the Sarbanes-Oxley Act are associated with lower bid-ask spreads and therefore improved market liquidity. The coefficient estimates for the $Restate_i$ dummy provide support for our first hypothesis that market liquidity decreases following the restatement announcements. Specifically, both (log) relative quoted and effective spreads increase significantly on average by 0.38% and 0.53%, respectively, in the three-day event window [0, 2]. The average (log) relative quoted and effective spreads are higher by 0.44% in the post- versus pre-restatement announcement period.

To capture the effects of financial restatements on both spreads and depths, we run a regression for the market quality index controlling for the spread determinants. Consistent with Chung *et al*. (2010), the market quality is higher for firms with higher trading volumes, lower prices and lower return volatilities. Similar to the spread results, being cross-listed significantly increases market quality. However, unlike the spread results, the introduction of Sarbanes-Oxley is not associated with an increase in market quality. The coefficient for the dummy variable $Restate_i$ is negative and significant, which suggests that the market quality decreases significantly during the three-day event window. This result also shows that financial restatements affect both dimensions of market liquidity (i.e. spreads and depths). Although market quality is still lower in the post-restatement period as suggested by the negative coefficient of $Post\text{-}restatement_i$, it is not statistically significant.

[Please insert table 2.4 about here.]

2.5 ASYMMETRIC INFORMATION EFFECTS AROUND FINANCIALRESTATEMENTS

2.5.1 Behavior of Spread Components

2.5.1.1 Methodology

In this section, we test our second hypothesis that the permanent and temporary spread components respectively increase and decrease following the restatement announcements. The two spread components for the pre- and post-restatement announcement periods are estimated using the following models of Madhavan, Richardson and Roomans or MRR (1997) and Glosten and Harris or GH (1988) (further details are given in Appendix 2.2):

Madhavan, Richardson and Roomans:

$$\Delta p_t = \alpha + (\phi + \theta) I_t - (\phi + \rho\theta) I_{t-1} + \mu_t \tag{2.2}$$

Glosten and Harris:

$$\Delta p_t = c_0 (I_t - I_{t-1}) + c_1 V_t (I_t - I_{t-1}) + z_0 I_t + z_1 V_t I_t + \varepsilon_t \tag{2.3}$$

where α is the constant drift; ϕ represents the transitory effect of order flow on prices; θ represents the degree of information asymmetry or the permanent effect of order flow on prices; ρ is the first-order autocorrelation of the trade indicator variable I_t; I_t and I_{t-1} are the trade indicator variables (+1 for a buyer initiated trade and -1 for a seller-initiated trade); and V_t is number of shares traded in transaction t.

2.5.1.2 Empirical results

The spread component estimates based on both models for the pre- [-55, -10] and post-announcement [10, 55] periods and tests of their differences, which are reported in panels A and B of Table 2.5, support our second hypothesis of an increase and a decrease in the permanent and

temporary spread components following the restatements.[12] The mean adverse selection component increases significantly from 1.32 to 2.12 cents (*t*-stat = 3.26) for the MRR model and insignificantly from 1.57 cents to 1.63 cents for the GH model from the pre- to post-announcement period. The order processing component decreases significantly from 1.34 cents to 0.71 cents (*t*-stat = -2.51) based on the MRR model, and from 4.23 cents to 3.41 cents (*t*-stat = -2.41) based on the GH model.

The proportion of the spread attributable to adverse selection increases following restatement announcements by a significant 18.58 percent (*t*-stat = 3.02) for the MRR model, and by an insignificant 4.21 percent (*t*-stat = 0.80) for the GH model. Given that the proportions add to 100 percent, the proportion associated with the order processing component decreases significantly by 18.58% (*t*-stat = -3.02) for the MRR model and insignificantly by 4.21% (*t*-stat = -0.80) for the GH model. Thus, the unfavorable effect (increase) of restatement announcements on total spreads is caused by their unfavorable effect on the asymmetric or permanent component of the spread given that the temporary component decreases.

Panels C and D of Table 2.5 report the MRR model spread components of the revenue recognition and cost or expense subsamples. The mean permanent component and transitory component of the spread significantly increase and decrease, respectively, for restatements involving revenue recognition problems. Therefore, the increase in total spreads for the revenue recognition subsample is mainly due to the increase in the permanent component given that the temporary component decreases. In contrast, total spreads for the cost or expense subsample following the restatement announcements did not increase significantly because the increase in the permanent component sufficiently offset the decrease in the temporary component following the restatement announcements.

[Please insert table 2.5 about here.]

[12] Some restatement observations are eliminated for both models due to insufficient data or estimation problems.

2.5.2 Behavior of (Un)informed Trader Arrivals and the Probability of Informed Trade

2.5.2.1 Methodology

To examine another aspect of the effect of informational asymmetry on market behavior and to test our third hypothesis of an indeterminate change in PIN, we examine the trade behaviors of both informed and uninformed traders and the probability of informed trading (PIN) around restatement announcements using the EKOP model developed by Easley *et al.* (1996) (further details are given in Appendix 2.2).[13] PIN is estimated for the periods around the announcements by maximizing the following likelihood function:

$$L(M|\theta) = \prod_{i=1}^{I} L((B_i, S_i|\theta) \tag{2.4}$$

where B and S are the total number of buys and sells for the day, respectively, and the parameter vector is $\theta = (\alpha, \delta, \varepsilon, \mu)$. The probability of informed trade (PIN) is given by:

$$PIN = \alpha\mu / (\alpha\mu + 2\varepsilon) \tag{2.5}$$

2.5.2.2 Empirical results

Summary statistics for the estimated parameters of the EKOP model for the full sample (201 restatements) are reported in panels A, B and C of Table 2.6. The arrival rates of informed and uninformed traders (μ and ε) are scaled by their pre-announcement values to facility comparison. The percentage differences of these two variables instead of their raw differences are compared, as in Easley *et al.* (2001).

[Please insert table 2.6 about here.]

[13] One should distinguish between privately informed traders and insiders. The latter is a subset of the former. See Li and Zhang (2006) and Agrawal and Cooper (2008) for insider trading activities around restatement announcements.

The probability of an information event (α) increases insignificantly (from 0.3361 to 0.3374 for the mean) following the restatement announcements. Thus, restatement announcements do not significantly change the market's expectation of the probability of future information arrival. Similarly, the probability that any information is bad news (δ) does not change significantly based on the mean, although the median change from 0.50 to 0.51 following announcement is marginally significant.

The arrival rates of both informed and uninformed traders (μ and ε) increase significantly by 26.20% and 55.16%, respectively, upon announcement. The behavior of the informed is consistent with Kyle's (1985) conjecture that the informed adjust their trading in response to changes in uninformed trading.

The effect on the probability of informed trading (PIN) is determined by the complex net effect of the changes in the arrival rates of both informed and uninformed traders and the probability of information events from the restatement announcements. The PIN increases insignificantly from 0.2620 to 0.2727 following such announcements because both arrival rates increase significantly while the probability of an information event remains unchanged.

Based on the PIN analysis reported in Panel D of Table 2.6 for the cost or expense subsample, the probability of an information event does not increase significantly (as for the full sample) and the probability of informed trading increases significantly (unlike for the full sample). Both the mean and median probabilities of the information being bad news increase significantly after these announcements. The arrival rates of informed and uninformed investors increase significantly and insignificantly, respectively, after these announcements. When considered together with previous results that the adverse selection spread component increases significantly following these announcements, this evidence implies that information asymmetry has increased for cost or expense restatements post-announcement.

Duarte and Young (2009) find that PIN is only priced for illiquidity unrelated to information asymmetry and that the component related to asymmetric information is not priced. They argue that the PIN model developed by Easley *et al.* (1996) cannot explain the pervasive positive correlation between buyer- and seller-initiated order flow and the variances of buy and sell order flow. We examine whether this is the case for our data. Table 2.7 reports the summary statistics on the number of buyer- and seller-initiated trades for both pre- and post-restatement announcement periods. We report the median, 5^{th}, 25^{th}, 75^{th} and 95^{th} percentiles of the mean for mean buyer-initiated trades, mean seller-initiated trades, variances of buy and sell orders, and the correlations between the buys and sells. Similar to the findings of Duarte and Young (2009), we find that the buy orders are more volatile than sell orders, except for 25^{th} percentile of the mean for both the pre- and post-restatement periods and 5^{th} percentile of the mean for the post-restatement period. In addition, the correlations between buyer- and seller-initiated trades are positive, except for the 5^{th} percentile of the mean for both the pre- and post-restatement periods. Thus, our results are consistent with those reported by Duarte and Young (2009).

[Please insert table 2.7 about here.]

2.6 IMPACT OF FINANCIAL RESTATEMENTS ON CONSENSUS EXPECTATIONS

2.6.1 Impact on Earnings Forecasts and Their Dispersion

2.6.1.1 Methodology

In this section, we test our fourth hypothesis that the change in consensus earnings forecasts of analysts and their dispersion is negative and indeterminate following restatement announcements. To investigate the impact of restatement announcements on the forecasts of financial analysts, we first measure their earnings forecast revisions around the restatement announcements. The earnings forecasts are obtained from the Institutional Brokers Estimate System (I/B/E/S) Summary History Tape. To be included for this test, an announcement must

satisfy three criteria. First, the earnings forecast must be available one month before and after the restatement announcements. Second, the stock price must be available 30 days before the restatement announcement. Third, the current and next fiscal years for the forecasts are unchanged for each restatement announcement, as in Denis *et al.* (1994).[14] This results in a final sample of 88 and 87 observations, respectively, for the current and next fiscal year earnings forecasts.

The earnings forecast revisions of analysts for the current and next fiscal years are measured using:

$$FR_{i,(t-1,t+1)} = \left(AF_{i,t+1}/P_{i,t-1}\right) - \left(AF_{i,t-1}/P_{i,t-1}\right) \tag{2.6}$$

In (2.6), $AF_{i,t+1}$ and $AF_{i,t-1}$ are the mean (median) forecasts of earnings of analysts for firm *i* made respectively one month after and before the restatement announcement; and $P_{i,t-1}$ is firm *i*'s stock price 30 days before the restatement announcement. The mean and median forecasts of earnings of analysts in U.S. dollars are converted into Canadian dollars using the I/B/E/S Daily Exchange Rate. Changes in analysts following the firms and in the dispersions (standard deviations) of their cross-sectional earnings forecasts between the pre- and post-restatement announcement periods also are examined. The sample is further reduced to 62 observations when examining changes in the dispersion of the EPS forecasts of analysts.

2.6.1.2 Empirical results

Panel A of Table 2.8 presents the results of revisions of earnings (EPS) forecasts by analysts for the current fiscal year. Consistent with Palmrose *et al.* (2004) and the fourth hypothesis, the mean (-0.0548, *t*-stat = -1.74) and median (-0.0408, *t*-stat = -2.29) EPS forecasts decline

[14] The next fiscal year changes into the current fiscal year in I/B/E/S when a firm's earnings have been reported. For example, if a firm's fiscal year end is August, the actual earnings for fiscal year 2000 are reported in October 2000. In September 2000, prior to the earnings announcement, the current fiscal year forecast is still the fiscal year 2000. However, the current fiscal year forecast is for the fiscal year 2001 in October 2000.

significantly following the restatement announcements. Based on Panel B of Table 2.8, the mean and median EPS forecasts of analysts for the next fiscal year also decline significantly in the post-announcement period, consistent with Hribar and Jenkins (2004) who find a significant decrease in one-year ahead EPS. Based on Panel C of Table 2.8, the mean analysts following decreases insignificantly after the restatement announcements.

Chung *et al*. (1995) and Van Ness *et al*. (2001) find that financial analysts have greater incentives to follow a stock with greater information asymmetry since the value of private information increases with information asymmetry. In contrast, Brennan and Subrahmanyam (1995) find greater analyst following leads to greater information production and a reduction in the adverse selection component of the spread. Our result is in line with the findings of Brennan and Subrahmanyam (1995) because the permanent (or adverse selection) component of the spread increases significantly following restatement announcements. Easley *et al.* (1998) argue that analyst following is not a good proxy for the level of private information as this measure is negatively related with PIN. We also find a similarly weak relation between analyst following and PIN.

Based on Panel D of Table 2.8, the dispersion in the EPS forecasts of analysts (as measured by their standard deviation) increases insignificantly from 0.1655 to 0.1971 following the announcements. This is inconsistent with Palmrose *et al.* (2004) who find a significant increase in dispersion for U.S. restatements.

The results in this section imply that Canadian restatement announcements are unexpected events for financial analysts; that they convey negative information, on average, regarding future earnings; and that revisions in earnings expectations are most likely a major driver of the negative abnormal returns associated with restatement announcements that we find in the following section of this chapter.

[Please insert table 2.8 about here.]

2.6.2 Impact on Abnormal Returns and Their Determinants

2.6.2.1 Methodology

In this and the subsequent section, we test our fifth alternative hypothesis that significant negative abnormal returns are associated with restatement announcements, and we identify the determinants of such abnormal returns. To study the stock price reaction to the restatement announcements, the following dual-beta market model is used:

$$R_{it} = \alpha_i + \beta_1 R_{mt} + \beta_2 R_{mt} D_1 + \sum_{j=-5}^{5} \gamma_{ij} D_{2j} + \varepsilon_{it} \qquad (2.7)$$

where R_{it} is the excess return on stock i for trading day t, and is equal to the return for stock i minus the Canadian one-month T-bill rate,

α_i is the intercept for stock i,

R_{mt} is the excess return for the market, where the market return is proxied by the return on the S&P/TSX Composite Index,

D_1 is a dummy variable equal to one on and after the restatement announcement and zero otherwise to account for the possibility that the beta of the firm might change due to the restatement announcement,

D_{2j} is the event dummy variable equal to one for stock i for day j in the event window that covers the eleven days centered on the restatement announcement and zeros otherwise, and

ε_{it} is the error term that is assumed to be normally distributed with zero mean, constant variance and zero correlation between error terms across and over time.

The Ars are estimated using 250 trading days before and 100 trading days after the announcement day. The estimated coefficients $\gamma_{-5i,\ldots,}\ \gamma_{5i}$ are the daily Ars during the eleven-day event window [-5, 5] for stock i. The daily Ars are then averaged across all the stocks to obtain the daily average abnormal returns (AARs). The cumulative average abnormal returns (CAARs) are the sum of the AARs over a given multi-day time period. Nonsynchronous trading problems

are corrected using a Scholes and Williams (1977) type of procedure by estimating the coefficients on lagged, lead and contemporaneous market excess returns.

Cross-sectional regression analyses are performed to examine the AR determinants. The dependent variable is the three-day CAAR from the event day to two days after the restatement announcements. We include a dummy variable REVENUE, which is equal to one if the restatement is related to revenue recognition problems and is zero otherwise. We also include the variables indicating the party who initiated the restatements as COMP, AUDITOR and REGULATOR. The three variables are equal to one if the company, auditor, or regulator initiated the restatements, respectively, and are zero otherwise. SIZE, which is measured as the natural log of market capitalization, is included as a control variable. Hegde and McDermott (2003) argue that if the announcement (in their case the addition of a stock to the S&P 500 Index) leads to an improvement in market quality, part of the Ars should be related to the decline in the effective spread. Following Hegde and McDermott (2003), we include the variable EFFSPRDDIFF, which is measured as the change in effective spreads over the post- versus pre-restatement period using the MRR model. The effective spread in the MRR model is given by $(1-\lambda)(2\phi + \theta)$. For the subsamples with available earnings forecasts, we include the variable FR to examine whether Ars are related to revisions of the earnings forecasts of analysts.[15]

2.6.2.2 Empirical results

Based on panel A of Table 2.9, the AARs are not significant for each of the five days pre-event for the full sample. As expected and consistent with our fifth alternative hypothesis, the AARs on the announcement day of -2.61%, on the day after the announcement of -1.73% and on the second day after the announcement of -0.90% are significantly negative at the 1% level.

[15] Only the median revision is used in the reported regression. The results are generally the same using the mean.

Similarly, the three-day mean CAARs for the windows [-1, 1] and [0, 2] of -4.70% and -5.24%, as are their corresponding medians, are significant at the 1% level.

[Please insert table 2.9 about here.]

Based on panel B of Table 2.9, the CAARs are significantly negative for both TSX-listed (-4.49%) and cross-listed stocks (-6.67%), and their difference is not statistically significant. Based on Panel C of Table 2.9, the CAARs are more negative for restatements with earnings releases (-6.66%) than without earnings releases (-4.02%), but their difference is not statistically significant. This finding contrasts with that of Palmrose *et al.* (2004) who document significantly more negative Ars for their no-earnings release group than their earnings release group. Based on panel D of Table 2.9, significant negative Ars are found for financial restatement announcements associated with the following reasons: Cost or expense, Revenue recognition, Securities related, Reclassification, and Other. Consistent with Anderson and Yohn (2002), Akhigbe *et al.* (2005) and our fifth hypothesis, the CAARs for revenue-recognition related financial restatements are significantly more negative (-14.23%) than those related to reasons of Cost and expense (-4.24%), Securities related (-4.06%), Reclassification (-2.47%) and Other (-3.81%).

Regression results for the determinants of the three-day CAAR for [0, 2] are reported in Table 2.10. Consistent with our univariate results, restatements associated with revenue recognition problems have more negative Ars for both models (i.e., with and without the inclusion of revisions in the EPS forecasts of analysts). This finding is consistent with those of Anderson and Yohn (2002), Akhigbe *et al.* (2005) and our fifth hypothesis. Similar to Hribar and Jenkins (2004) and Palmrose *et al.* (2004), company-initiated restatements are associated with more pronounced negative Ars, but not for regulator-initiated restatements. Unlike Hribar and Jenkins (2004) and Palmrose *et al.* (2004), auditor-initiated restatements are not associated with more negative Ars. Size also is not a significant AR determinant. The coefficient estimates of the effective spread differences for both models are negative, but not statistically significant. This result indicates that Ars are not associated significantly with changes in illiquidity following

restatements. The estimated coefficient for the revisions in the earnings forecasts of analysts is significant for the subsample regression, suggesting that such revisions play a significant role in explaining the negative Ars for restatement announcements when this variable proxies for market expectations. It also implies that such revisions by analysts, like those of the general market, change due to the restatement announcements.

[Please insert table 2.10 about here.]

2.6.3 Impact on Volatility of Residual Stock Returns

2.6.3.1 Methodology

In this and the subsequent section, we test our sixth alternative hypothesis that both volatility components increase following restatement announcements. To capture the effect of restatement announcements on the volatility components, we use the component GARCH model of Engle and Lee (1993, 1999) to model conditional residual volatility. Specifically:

$$h_{it} - q_{it} = \delta_i(\varepsilon_{it-1}^2 - q_{it-1}) + \mu_i(h_{it-1} - q_{it-1}) + \tau_{i1}D_1 \tag{2.8}$$

$$q_{it} = \omega_i + \rho_i(q_{it-1} - \omega) + \varphi_i(\varepsilon_{it-1}^2 - h_{it-1}) + \tau_{i2}D_1 \tag{2.9}$$

The long-run component of volatility given by q_{it} in (2.9) is slowly mean reverting in an autoregressive manner. The short-run or transitory component of volatility is given by h_{it} - q_{it} in (2.8) where h_{it} is the conditional total volatility. The parameters τ_{i1} and τ_{i2} measure the impact of restatement announcements on the short- and long-run volatilities, respectively, and all the other terms are as previously defined.

Following Glosten *et al.* (1993) and Engle and Lee (1999), an asymmetric effect is also introduced into the transitory component to obtain:

$$h_{it} - q_{it} = \delta_i(\varepsilon_{it-1}^2 - q_{it-1}) + \theta_i(\varepsilon_{it-1}^2 - q_{it-1})d_{t-1} + \mu_i(h_{it-1} - q_{it-1}) + \tau_{i1}D_1 \tag{2.10}$$

In (2.10), d_{t-1} is a dummy variable that is equal to one if ε_{it-1} is a negative shock, and is zero otherwise. A transitory leverage effect occurs in the conditional variance if θ is greater than zero.

The coefficients of equations (2.8), (2.9) and (2.10) are estimated by maximum likelihood. The standard errors of the parameters are computed using the Marquardt algorithm.

2.6.3.2 Empirical results

The mean parameter estimates and their corresponding t-values for the CGARCH without asymmetry effects are reported in columns 2 and 3, and those with asymmetry effects in columns 4 and 5 of Table 2.11. Consistent with our fifth alternative hypothesis, the AARs are still significantly negative as expected on the day of and the day after the financial restatement announcements for both models. The β_1 estimates, which measure the sensitivity of the restating firm's stock returns with those of the market, are marginally below 0.52 and are highly significant for both models. The β_2 estimates, which measure the impact of the financial restatement announcements on the sensitivity to market risk, are positive but not significant at the 0.05 level for both models (mean values of 0.0637 and 0.1328 without and with asymmetry effects, respectively). Thus, as expected, restatement announcements do not significantly change the restating firm's market risk.

The θ estimate, which measures the presence of an asymmetry effect in the variance, is positive and significant (mean = 0.0789, *t*-stat = 11.55). The τ_1 and τ_2 estimates, which measure the change in the short-run or transitory noise-trading-induced and long-run or information-based permanent volatilities of residual returns, are both insignificant in the CGARCH without asymmetry effect. In contrast, the τ_1 estimate is positive but insignificant (τ_1 = 0.0027, *t*-stat = 1.16) and the τ_2 estimate is positive and significant (τ_2 = 0.0185, *t*-stat = 12.12) in the CGARCH with asymmetry effect. Similarly, the effect of the restatement announcements on total residual volatility (as measured by $\hat{\tau}_1 + \hat{\tau}_2$ is negative and insignificant for the CGARCH without asymmetry effect, and positive and significant for the CGARCH with asymmetry effect ($\hat{\tau}_1 + \hat{\tau}_2$ =0.0212; *t*-stat = 11.63). Due to the asymmetric effect of wealth-induced changes in leverage on

volatilities (Christie, 1982), our results are consistent with our jump risk hypothesis that the total volatility and its permanent (not temporary) component increase following restatement announcements (our alternative hypothesis six). The mean ρ estimates of 0.6485 and 0.6254 for the CGARCH without and with asymmetric effect, respectively, are much lower than the value reported in Engle and Lee of about 0.99 for the mean-reverting speed of the long-run component of residual return volatility for the market. This result could be attributed to the much shorter estimation period used in this chapter (less than one year) when compared to the multi-decade time period used by Engle and Lee.

The increases in the total return volatility and its permanent component, together with the results of an increased spread for the revenue recognition subsample and an increased dispersion in the forecasts of analysts (albeit insignificant) indicate that the second signal of financial restatements is also material. That is, financial restatements are associated with changes in the uncertainty of future cash flows for restating firms.

[Please insert table 2.11 about here.]

2.6.4. Impact on Stock Return Synchronicity

2.6.4.1 Methodology

In this and the subsequent section, we test our seventh and final alternative hypothesis that stock price synchronicity increases following restatement announcements. Similar to Morck *et al*. (2000), Durnev *et al*. (2003), and Jin and Myers (2006), the following regression is used to test whether stock price synchronicity changes after the restatement announcements:

$$R_{i,t} = \alpha_i + \beta_{1i} R_{m,t} + \beta_{2i}[R_{US,t} + EX_t] + \varepsilon_i \qquad (2.11)$$

In (2.11), $R_{i,t}$ is stock i's return, $R_{m,t}$ is the return on the S&P/TSX Composite index, $R_{US,t}$ is the return on the S&P 500 index obtained from the Center for Research on Security Prices (CRSP), and EX_t is the rate of change in the exchange rate per U.S. dollar. The term $R_{US,t} + EX_t$ translates

U.S. market returns into local currency units. The S&P 500 return is included because approximately one third of the total sample is cross listed on American exchanges, including NYSE, NASDAQ, AMEX and OTC, and the Canadian and U.S. markets are to a large extent integrated. The regression is estimated separately using daily and then weekly returns for the 12-month period ending one month before restatement announcements and then for the 12-month period starting one month after such announcements. Weekly returns are used to dampen any microstructure effects that can be more influential with daily data. In a similar fashion, the zero-return metric is the number of zero-return days over each of these 12-month pre- and post-restatement periods.

2.6.4.2 Empirical results

Panels A and B of Table 2.12 report the R^2 values in the pre- and post-restatement announcement periods as well as their change for the full sample. Consistent with our seventh alternative hypothesis, the R^2 estimates increase significantly following restatement announcements based on daily returns (mean = 0.0097, *t*-stat = 2.14) and based on weekly returns (mean = 0.0245, *t*-stat = 2.53). This implies that stock prices move with the market more frequently and relatively less firm-specific information is incorporated into the returns after the restatement announcements. Based on Panels C and D of Table 2.12, the significant increases in R^2 post-announcement are mainly due to the one subsample with a significant R^2 change (i.e., the securities-related subsample).[16] Contrary to the findings of Asbaugh-Skaife *et al*. (2006), stock price synchronicity measured by R^2 does capture the relative effect of firm-specific information on stock prices.

Panels E and F of Table 2.12 present the zero-return metric values for the full sample and the only subsample with a significant change in this metric (i.e., the revenue recognition subsample).

[16] The changes in R^2 are not significant for all the other subsamples.

Consistent with our seventh alternative hypothesis, the mean proportion of zero daily returns increases insignificantly by 0.47% for the full sample and significantly by 3.29% for the revenue-recognition subsample in the post-announcement periods.

Lesmond (2005) and Bekaert *et al*. (2007) use the incidence of zero daily returns as a measure of illiquidity for emerging markets. When interpreted in this fashion, the increase in zero returns in the post-period for restatement announcements associated with revenue recognition problems is consistent with earlier results that find a decrease in liquidity based on relative spreads, the Amihud (2002) illiquidity measure and market depth for this type of restatement announcement.

[Please insert table 2.12 about here.]

2.7 CONCLUSION

We investigated the effects of 210 Canadian financial restatement announcements on liquidity, spread components, (un)informed arrival rates, informed trading probabilities, analyst followings and earnings forecasts, price effects, residual return volatilities and their components, and price synchronicities over 1997-2006. Our results support the hypothesis that information asymmetry increases after restatement announcements. Significant increases occur in the arrival rates of (un)informed investors, residual return volatilities and their permanent component and in illiquidity after restatement announcements.

We documented deterioration in market liquidity as manifested in an increase in relative quoted and effective spreads and a decrease in depths (median only) for revenue-recognition restatements following the announcements. After controlling for literature-identified spread determinants (such as price, volume and volatility) in a multivariate setting, we found that both relative quoted and effective spreads increase in the announcement windows for the full sample, remain elevated post-announcement, are lower for U.S. cross-listed firms, and for such announcements after the enactment of Sarbanes-Oxley in 2002. By using the market quality index

which captures the effects of financial restatements on both spreads and depths, we found that market quality decreases during the announcement window and is higher for U.S. cross-listed firms.

We documented a significant negative stock price reaction to restatement announcements over a three-day window [0, 2] of approximately 5.2 percent. More negative abnormal returns (Ars) are associated with restatements involving revenue recognition problems and those initiated by the company. The negative Ars associated with restatement announcements are positively and significantly related to changes in the consensus forecasts of earnings of analysts over these unexpected events.

With regard to the change in price synchronicity after the financial restatements, we documented a higher R^2 for the securities-related subsample and a higher proportion of zero-returns for the revenue-recognition subsample. For both subsamples, stock prices reflected relatively less firm-specific information and more market-related information following the restatement announcements. Thus, both metrics appear to be useful in measuring price synchronicity.

Thus, our findings support the overriding hypothesis that financial restatements diminish market quality and send two information signals to market participants. The first signal is that the future earnings prospects of the restating firms are diminished; and the second signal is that the uncertainty of future cash flows of the restating firms due to increased informational asymmetry has increased.

CHAPTER THREE

CANADIAN FINANCIAL RESTATEMENTS AND CORPORATE GOVERNANCE

3.1 INTRODUCTION

Good corporate governance is central to the effective and efficient operation of the corporation and it plays a significant role in protecting shareholders' interests and maximizing shareholder value. Following the accounting scandals, there have been significant developments in corporate governance such as the passage of the Sarbanes-Oxley Act (SOX) of 2002. In April 2005, the Ontario Securities Commission approved National Instrument 58-101, *Disclosure of Corporate Governance Practices*, and National Policy 58-201, *Corporate Governance Guidelines*, which replaced the corporate governance guidelines imposed by the Toronto Stock Exchange in 1994.

While prior research has examined the relation between governance characteristics and financial fraud (Beasley, 1996; Dechow *et al*., 1996; Abbott *et al*., 2000), limited research exists on the effectiveness of governance regulations in preventing the occurrence of restatements. Abbott *et al*. (2004) investigate the association between audit committee characteristics and the likelihood of financial restatements. Agrawal and Chadha (2005) examine the relation between governance mechanisms and the probability of financial restatement.

The previous literature provides mixed results on the consequences of financial fraud. While some studies do not find that SEC enforcement actions for GAAP violations are associated with an increase in subsequent managerial turnover (Beneish, 1999; Agrawal *et al*., 1999), more recent studies find turnovers of CEOs, top executives (CEOs, Presidents and Board Chairs), CFOs, and outside directors are greater for restating firms than control firms (Srinivasan, 2005; Desai *et al*., 2006; Arthaud-Day *et al*., 2006; Agrawal and Cooper, 2007; Collins *et al*., 2009). Agrawal and Cooper (2007) document a higher auditor turnover for restating firms in a univariate analysis, but find the relation vanishes using a multivariate analysis. While the U.S. literature divides the board

of directors into inside and outside (including grey and independent) directors (Beasley, 1996; Agrawal and Chadha, 2005), the Canadian governance guidelines define directors as unrelated and related directors (see section 3.2.3 for particulars).

We extend previous studies by examining the relation between corporate governance characteristics and the likelihood of restatement using the more recent time period. We also extend the literature by examining the consequences of restatement announcements on the turnover of unrelated directors, audit committees, and external auditors in addition to top executives and CFOs using hand-collected data from proxy statements. We believe that we are the first to examine the relation between financial restatements and governance from a Canadian perspective to further test the robustness of inferences drawn primarily for U.S. restatement announcements.

Canada provides an ideal alternative laboratory for examining the impact of corporate restatements on corporate governance given its similarities and differences with the US. Both countries share similar legal, institutional and regulatory environments, including corporate governance mechanisms and minority shareholder protections but not regulatory enforcement. However, Canadian public companies differ from their U.S. counterparts in that the percentages of Canadian public firms with controlling shareholders (concentrated ownership), families as the ultimate controlling shareholders, and issued restricted or subordinated voting shares and pyramidal structures are higher (e.g., Gadhoum *et al.*, 2005; Gadhoum, 2006; King and Santor, 2008).

We examine a sample of 177 Canadian firms who announced restatements over the period of 1997-2006 and 177 matched control firms using a novel, hand-collected dataset of corporate governance characteristics. Consistent with Abbott *et al*. (2004) and Agrawal and Chadha (2005) for 88 and 159 U.S. public firms, we find that the likelihood of restatement is lower when a Canadian firm's audit committee includes at least one director with financial expertise. In addition, firms are less likely to restate when they have bigger blockholder and management

ownerships (unlike Abbott *et al*., 2004), a lower leverage ratio (unlike Abbott *et al*., 2004), and when their external auditor is one of the big 5 auditors (unlike Agrawal and Chadha, 2005). We find no evidence that the likelihood of restatement is higher for firms with a lower proportion of unrelated directors (like Abbott *et al*., 2004; Agrawal and Chadha, 2005), or whose CEO is also the Board Chair or belongs to the founding family (like Abbott *et al*., 2004 but unlike Agrawal and Chadha, 2005).

Using a logistic regression that controls for other turnover determinants, we find that the CEO, President, CFO and external auditor turnover are significantly higher for restating firms compared to control firms within the two years following restatement announcements. The return on assets is significantly and negatively related to turnover of both executives and external auditors. The abnormal returns associated with restatement announcements are also significantly and negatively related to turnover of executives. However, we do not find that restatement announcements are related to a higher turnover of the Board Chair, unrelated directors and audit committee members.

While adherence to the Sarbanes-Oxley Act (SOX) of 2002 was voluntary for foreign firms with fiscal years prior to July 15, 2006, Anand *et al.* (2012) find that Canadian firms included in the S&P/TSX Composite Index over the five-year period 1999-2003 voluntarily adopted U.S. standards (SOX) rather than Canadian guidelines, regardless of their ownership structure. According to Burks (2007, 2010) and Collins *et al*. (2009), if the passage of the Sarbanes-Oxley Act (SOX) of 2002 enhances the accountability of management for financial reporting, then disciplinary actions against management for accounting restatements should be more severe. Therefore, we examine the impact of SOX on management turnover related to financial restatements. The results indicate that even though CEO, CFO and President turnovers are still positively related to restatement announcements in the post-SOX period, the passage of SOX has no impact on the likelihood of management turnover in the post- versus pre-SOX period. Even after controlling for other determinants of turnover and restatement severity, the sensitivity of CEO, top executives and CFO turnover to restatements do not increase in the post-SOX period.

However, the sensitivity of President turnover to restatements declines after SOX , which may due to the decline in restatement severity. In addition, the sensitivity of turnover to restatement severity does not change in the post-SOX period. The size of the restatements also does not increase the likelihood of executive turnover in the pre-SOX period. More negative abnormal returns are associated with a higher likelihood of CEO and CFO (but not President and top executive) turnover after SOX.

We find an increase in the number and proportion of unrelated directors and unrelated audit committee members as well as blockholder ownership two years after the restatement announcements. In addition, the governance characteristics of restating firms are not significantly different from control firms following the restatement announcements. The results provide evidence that restating firms attempt to improve their governance and restore their reputation after restatement announcements.

The remainder of this chapter is organized as follows. Section 3.2 provides a brief review of the prior literature. Section 3.3 discusses the data and our sample selection. Section 3.4 investigates the link between governance characteristics and the likelihood of restatements. Section 3.5 analyzes the turnover (managerial, director and auditor) associated with restatement announcements. Section 3.6 examines the changes in governance following restatement announcements. Section 3.7 concludes the paper.

3.2 PRIOR LITERATURE

3.2.1 Financial Restatements and Corporate Governance

Beasley (1996) investigates a sample of 75 fraud-associated firms with fraud during the period 1980-1991 and finds that a higher proportion of outside directors on the board (defined as

grey plus independent directors) reduces the likelihood of fraud.[17] Dechow *et al*. (1996) examine 92 firms convicted by the SEC for violations of Generally Accepted Accounting Principles (GAAP) between 1982 and 1992. They find that the likelihood of manipulating earnings are higher in firms with no audit committee and outside blockholders, who have a greater proportion of insiders on the board, and whose CEOs are Board Chairs or the founders of their companies. Abbott *et al*. (2000) study the relation between audit committee activity and independence and financial statement fraud using the same data source as Beasley (1996) and Dechow *et al*. (1996). They conclude that firms with audit committees which are composed of independent directors and which meet at least twice per year are associated with a lower incidence of financial fraud. Klein (2002) and Bedard *et al*. (2004) find a negative relation between earnings management and audit committee independence and expertise.

Two papers linking governance characteristics with the likelihood of financial restatement yield mixed results. Abbott *et al*. (2004) investigate the impact of audit committee characteristics identified by the Blue Ribbon Committee on the likelihood of financial restatements. They find that the presence of a completely independent audit committee, higher frequencies of meetings, and the presence of at least one audit committee with financial expertise are significantly negatively related to the likelihood of restatements. Agrawal and Chadha (2005) study the relation between governance characteristics and the incidence of restatements for a sample of 159 U.S. firms restating in 2000 or 2001. Their results suggest that firms with an independent director with financial expertise on their boards or audit committees and whose CEOs do not belong to the founding families are less likely to restate their earnings. Furthermore, they find that the likelihood of restatement is not related to board or auditor independence, the nonaudit services provided by outside auditors, and the use of Big 5 audit firms.

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[17]According to Beasley (1996), outside directors are non-employee directors. Grey directors are outside directors who are related to management such as retired executives of the firm or have business relationships with the company such as consultants, suppliers, attorneys, and investment bankers. Independent directors are outside directors who have no tie to the firm outside of their role as directors.

3.2.2 Financial Restatements and Turnover

Evidence regarding the consequences of financial fraud on the permanency of the firms' executives is mixed. Beneish (1999) finds no significant differences in CEO turnover among firms that overstated their earnings and control firms that did not. Similarly, Agrawal *et al*. (1999) find that fraud revelation is not significantly related to an increase in turnover among management or directors.

Srinivasan (2005) reports that outside directors (especially audit committee members) experience higher turnover for income-decreasing restatements. Persons (2006) finds that the revelation of fraud and lawsuits is associated with higher turnover of top-executives (CEO, president, and Board Chair). Desai *et al*. (2006) report that at least one of the top executives leaves the company within two years following restatement announcements, and that displaced managers subsequently have difficulty in finding new jobs or accept poorer quality new employment. Arthaud-Day *et al.* (2006), Agrawal and Cooper (2007) and Collins *et al*. (2009) report greater CFO turnover for restating versus control firms. Arthaud-Day *et al.* (2006) also find that restatement firms are more likely to experience turnover of outside directors and audit committee members than control firms. Agrawal and Cooper (2007) find no significant relation between external auditor turnover and restatement announcements. Collins *et al*. (2009) find that the higher CFO turnover rate related to the restatements is not affected by the passage of the Sarbanes-Oxley Act, but terminated CFOs of restating firms suffer greater labor market penalties in the post-Sarbanes-Oxley Act period. Burks (2010) finds that despite the decline in the severity of restatements, disciplinary actions against CFOs have been strengthened after SOX as the relation between CFO turnover and restatements becomes stronger in the post-SOX period. However, CEOs are penalized by reductions in bonus payout instead of terminations after SOX, which is a less severe penalty commensurate with less severe restatements. Wang and Chou (2011) find that restatement characteristics such as core-earnings and the magnitude of the net

income restated significantly affect the likelihood of management turnover. These results suggest that the higher the restatement severity, the higher the likelihood of CEO or CFO turnover.

3.2.3 Canadian Regulations Regarding Corporate Governance

In Canada, the Toronto Stock Exchange (TSX) Committee on Corporate Governance issued a report containing fourteen proposed guidelines for effective corporate governance on December 20, 1994. The TSX requires all listed corporations to disclose on an annual basis their approach to corporate governance with reference to the TSX Guidelines. According to the guidelines, "an unrelated director is a director who is free from any interest and any business or other relationship which could, or could reasonably be perceived to, materially interfere with the director's ability to act with a view to the best interests of the corporation".

In the aftermath of the accounting scandals, significant developments occurred in corporate governance, such as the enactment of the Sarbanes-Oxley Act of 2002 that imposes corporate governance requirements to all the companies whose securities are listed on stock exchanges in the United States. In Canada, the Canadian Securities Administrators have also engaged in reviewing existing corporate governance matters and recommending changes to the existing TSX guidelines. In April 2005, the Ontario Securities Commission (OSC) approved amendments to Multilateral Instrument 52-110 *Audit Committees* (MI 52-110) which came into force on June 30, 2005. The OSC also approved National Instrument 58-101 *Disclosure of Corporate Governance Practices* (NI 58-101) and National Policy 58-201 *Corporate Governance Guidelines* (NP 58-201). The instrument and the policy replaced the corporate governance guidelines imposed by the TSX, and came into force on June 30, 2005. National Instrument 58-101 requires the Corporation to identify directors as being independent or not independent (as defined in MI 52-110). A director is independent if the member has no direct or indirect material relationship with the

company. A material relationship is a relationship which could, in the view of the company's board of directors, reasonably interfere with the exercise of a member's independent judgement.[18]

3.3 SAMPLE AND DATA

Restatement announcements for Canadian companies are identified using searches of Lexis-Nexis News Wires for the ten-year period from January 1997 to December 2006. Key word searches are performed using "restate," "restates," "restated," "restating," or "restatement" as well as other variations such as "adjust" and "amend" and "revise" within 50 words of "financial statement" or "earnings." Restatement announcements are excluded if they result from discontinued operations, stock splits, stock dividends, mergers and acquisitions,[19] changes in business segment definition, changes made for presentation purposes, and changes in currency of reporting (for example, converting from Canadian to U.S. dollars). Restatements due to changes in accounting policy also are excluded as a general rule because they represent normal corporate activities which do not involve accounting fraud or errors.[20]

Our initial sample consists of 231 restatement announcements for firms listed on the Toronto Stock Exchange (TSX). The sample is reduced to 180 restatements after eliminating six firms with insufficient daily stock returns and closing prices in the Canadian Financial Markets Research Center (CFMRC) database, four firms with simultaneous trading halts and subsequent delistings, eighteen income funds, fifteen firms with multiple restatement announcements during

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[18] The meaning of independent is more strict than the meaning of unrelated. An independent director must be an unrelated director, but an unrelated director is not necessarily an independent director.

[19] For example, a firm restates its financial statements after completion of a merger where the merger was accounted for as a pooling of interests.

[20] We exclude firms adopting new accounting recommendations by the Canadian Institute of Chartered Accountants (CICA), Financial Accounting Standards Board (FASB) or the Emerging Issues Task Force (EITF). However, we include restatement announcements resulting from SEC clarifications of revenue recognition in financial statements (SEC Staff Accounting Bulletin No. 101) and lease accounting for operating lease (Feb. 7, 2005, letter from SEC's Chief Accountant to American Institute of Certified Public Accounts clarifying SEC staff's interpretation of certain accounting issues and their application under GAAP relating to operating leases). To our knowledge, there are no restatements resulting from the changes of Canadian regulations.

the 250 trading days used for analysis purposes, and eight firms with unavailable proxy statements or with first proxy statements filed in the System for Electronic Document Analysis and Retrieval (SEDAR) whose dates follow the restatement announcements.

Following Agrawal *et al*. (1999), Agrawal and Chadha (2005) and Young *et al*. (2008), we match each restating firm with a unique control firm that (1) has the same two-digit Compustat primary Standard Industrial Classification (SIC) industry code,[21] (2) has the closet market capitalization to the restating firm at the end of the fiscal year before the year of the restatement announcement,[22] and (3) did not announce any restatement in the two years preceding the restatement by its matched firm. A replacement control firm is selected if there is a restatement announced within the preceding 24 months. We add an additional requirement that the match firm has proxy statements available in SEDAR for the years for which such data are available for the restating firm to ensure that turnover data are comparable between sample and control firms. Market capitalization is measured as the monthly close price times the number of shares outstanding, both of which are obtained from CFMRC. The procedure reduces our final sample to 177 sample firms and 177 control firms.

Summary characteristics for the restating firms differentiated by the reason for the restatement, the party initiating the restatement and industry groups based on primary two-digit SIC codes are reported in Table 3.1. Because some firms report multiple reasons for their restatements, the total number of reasons reported in Panel A exceeds the total sample size. Cost or expense is the most common reason (25.5%), followed by other (23.4%) and revenue recognition (18.1%). The frequencies differ from those reported for U.S. restatements (e.g., Anderson and Yohn, 2002; Palmrose *et al.*, 2004; Hribar and Jenkins, 2004), where revenue recognition is the largest restatement category. Based on Panel B of Table 3.1, the initiators are

[21] We use Bloomberg or Factiva to obtain any missing SICs for restating firms.
[22] For six restating firms who started trading on the TSX later than the end of the fiscal year before the year of the restatement announcements, the match date is the first trading month in the CFMRC.

unknown for 42.9% of the reinstatements, followed by company-initiated restatements for 33.3% of the reinstatements. Based on Panel C of Table 3.1, 30.5% of the firms are in manufacturing, followed by 25.4% and 18.6% of the firms in mining and services, respectively. There is no financial restatements by firms in Agriculture, forestry, and fisheries.

[Please insert table 3.1 about here.]

The financial data for restating firms and control firms are obtained from the Compustat database. Missing data (except for sales growth) are obtained from Mergent online or hand collected from the firms' financial statements deposited with SEDAR (as are the governance variables from the proxy statements before the restatement announcements).

Because the dates when the CEO, President, Chair and CFO left their positions are usually available, we track the turnover of these persons within 24 months following the restatement announcements.[23] The dates of changes in unrelated directors and audit committee members are usually unavailable as these changes are usually only disclosed in the annual proxy. Thus, we track the turnover of unrelated directors and audit committee members using the subsequent two proxy statements issued after the restatement announcements.[24] We define top executive turnover as the turnover of CEOs, Presidents and Board Chairs.[25] Unrelated directors are considered to have turned over if the director leaves the Board or becomes a related director. Audit committee turnover occurs if a committee member leaves the board or the member still stays on the board but no longer as a member of the audit committee. If a person leaves a position due to retirement or death, we do not consider it to be turnover for the purposes of this study.

[23] If the firm only has a vice president of finance, we consider this position as the CFO.
[24] In this case, we need the data for 2007 and 2008.
[25] If the person is both the CEO (or President) and Chairman before the restatement and only the CEO (or President) after the restatement, we consider this to be turnover.

3.4 GOVERNANCE CHARACTERISTICS AND RESTATEMENT INCIDENCE

3.4.1 Univariate Analysis

Table 3.2 presents the summary statistics for the financial and governance variables for the restating and matched control firms. Both the median sales and total assets of control firms are significantly smaller than restating firms. The mean (median) leverage ratio is about 0.48 (0.48) for restating firms and 0.41 (0.39) for control firms. The mean (median) ROA is about -9.56% (-1.53%) for restating firms and -5.1% (0.97%) for control firms. Similar to Desai *et al*. (2006), we find that the restating firms are significantly more leveraged and have worse performance than control firms prior to the restatement announcements. Restating firms also have a higher sales growth rate, but the difference is not statistically significant. While the restating firms have a smaller board size, a lower proportion of unrelated directors, and more board meetings than the control firms, these differences are not statistically significant.

The mean audit committee size (3.32 members) for control firms is not significantly bigger than restating firms (3.28 members). The median proportion of unrelated audit committee members is significantly higher for control firms. The mean and median number of meetings held by the audit committee is significantly higher for restating firms. As in Abbott *et al.* (2004) and Agrawal and Chadha (2005), we define directors as having financial expertise if they hold a CPA, CFA, CA, investment banker or venture capitalist designation, or have served as chief financial officer, vice president of finance, controller or treasurer. The mean proportion of firms whose audit committees have at least one director with financial expertise is about 75% for restating and 83% for control firms, respectively. Both the differences in means and medians are statistically significant at the 10% level.

The mean proportion of restating (control) firms whose CEO is also the Board Chair is 0.34 (0.40). The mean (median) tenure of the CEO on the board is 8.47 (6) years for restating and 9.45 (7) years for the control firms. The mean proportion of firms whose CEOs belong to the founding

family is 37.3% and 33.3%, respectively, for the restating and control firms. However, none of the above differences are statistically significant.

The ownership of restating and control firms is also similar. Blockholder ownership is defined as the percentage of voting rights held by outside blockholders with at least 10 percent of the voting rights attached to any class of voting securities who are unaffiliated with management.[26] For a firm with a dual-class structure (i.e. subordinate and multiple voting shares), blockholder ownership is calculated as the sum of multiple voting shares times the number of votes each multiple voting shares carries and subordinate voting shares owned by blockholders, which is divided by the sum of total outstanding multiple voting shares times the number of votes each multiple voting shares carries and all subordinate voting shares. Management ownership is the percentage of voting rights held by management (for example CEO, President, Executive Vice President, Vice President, Chief financial officer) who serves on the board. We find that control firms have higher (not statistically significant) ownership by blockholders, CEOs, managements, related and unrelated directors and top three persons (CEO, President and Board Chair) than restating firms. The number of outside blockholders who own 10 percent or more of the voting rights is significantly higher for control firms (0.76) than restating firms (0.58).

The proportion of firms whose external auditor is a Big 5 auditing firm (Arthur Andersen, Deloitte Touche Tohmatsu, Ernest & Young, KPMG, and PricewaterhouseCoopers) is significantly higher for control firms (0.91) than restating firms (0.81). The non-audit fees paid to the external auditor at 34% and 30% of the total audit fees for the restating and control firms, respectively, are not significantly different.

[Please insert table 3.2 about here.]

[26] We use five percent as the criteria for blockholder ownership if the firm uses five in its proxy statements. Outside blockholders do not include clearing Agencies such as Cede & Co. and CDS & Co. who are only nominees and not beneficial owners of common shares. The Company usually has no knowledge of the beneficial owners of these shares.

3.4.2 Correlations

Table 3.3 reports the correlations between the independent and explanatory variables. The likelihood of restatement (RESTATE) is significantly and positively correlated with leverage and sales growth. The likelihood of restatement is lower when the audit committee has at least one director with financial expertise (EXPERT) and the external auditor is a Big 5 auditing firm (BIG5). The proportion of unrelated directors (PUNRELDIR) is significantly and positively correlated with the proportion of unrelated audit committee members (PUNRELAUD) and outside blockholder ownership (BLOCKHLD), and is higher when the external auditor is a Big 5 firm (BIG5). The proportion of unrelated directors (PUNRELAUD) is significantly and negatively correlated with sales growth, and is lower when the CEO also chairs the board (CEOCHAIR) or the CEO belongs to the founding family (CEOFOUND). The proportion of unrelated audit committee members (PUNRELAUD) is significantly and negatively correlated with sales growth, and is higher when the audit committee has at least one director with financial expertise (EXPERT) and the external auditor is a Big 5 firm (BIG5). When the CEO belongs to the founding family, it is less likely that the audit committee has at least one director with financial expertise (EXPERT). A CEO who is also the Board Chair is more likely to belong to the founding family (CEOFOUND) and have less blockholder ownership (BLOCKHLD). When the CEO belongs to the founding family, the shares owned by outside blockholders are lower (BLOCKHLD). CEO ownership is lower when the external auditor is a Big 5 firm (BIG5).

[Please insert table 3.3 about here.]

3.4.3 Logistic Regression

As a robustness test of our univariate analysis, we estimate the following logistic regression to examine the relation between governance characteristics and restatement announcements.

$$\text{RESTATE}=f(\text{PUNRELDIR or PUNRELAUD, EXPERT, CEOCHAIR, CEOFOUND, BLOCKHLD, MGMTOWN, BIG5, LEVERAGE, GROWTH}) \quad (3.1)$$

where RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero if the firm is a control firm. PUNRELDIR is the proportion of directors who are unrelated. PUNRELAUD is the proportion of directors in the audit committee who are unrelated. EXPERT is a dummy variable that is equal to one if the audit committee includes at least one director who is a financial expert. CEOCHAIR is a dummy variable that is equal to one if the CEO is also the Board Chair and zero otherwise. The board's monitoring function is less effective when the CEO is also the Board Chair (Jensen, 1993; Beasley, 1996; Dechow *et al*., 1996), so we hypothesize a positive relation between CEOCHAIR and the likelihood of restatement. CEOFOUND is a dummy variable that is equal to one if the CEO belongs to the founding family of the firm and zero otherwise. Dechow *et al*. (1996) argue that CEOs are less accountable to the board when they are also the company founders. We hypothesize that the likelihood of restatement is higher for firms with CEOs that belong to the founding family.

BLOCKHLD is the percentage of voting rights held by outside blockholders with at least 10 percent of the voting rights attached to any class of voting securities who are unaffiliated with management. According to Shleifer and Vishny (1986) and Beasley (1996), large outside blockholders have greater incentives to monitor management and therefore serve as an additional monitoring mechanism. We hypothesize a negative relation between blockholder ownership and the likelihood of restatement.

MGMTOWN is the percentage of voting rights held by managements who serve on boards. Stock ownership held by management could motivate management to increase stock value and therefore reduce the agency problems between managements and shareholders (Jensen and Meckling, 1976) or to artificially inflate the stock values that could lead to material management fraud (Loebbecke *et al*., 1989). Therefore, we do not hypothesize a direction for the relation between management ownership and the likelihood of restatement.

BIG5 is a dummy variable that is equal to one if the firm's external auditor is a Big five auditing firm and zero otherwise. Largest audit firms are associated with lower incidence of fraud

as they are quality-differentiated suppliers (Palmrose, 1988; Carcello and Nagy, 2004). We hypothesize a negative relation between BIG5 and the incidence of restatement.

LEVERAGE is calculated as the ratio of total liabilities divided by total assets in the fiscal year before the restatement announcements. Leverage is a proxy for the firm's demand for external financing which may explain why earnings are manipulated to avoid debt covenant violations (Dechow *et al*., 1996). We therefore hypothesize a positive relation between leverage and the likelihood of restatement. GROWTH is calculated as the compound growth rate of sales in the three years preceding the year of restatement announcements. Richardson *et al*. (2002) note that restatement firms are associated with high growth rates because they are under great pressure to inflate the earnings to meet analyst's expectations. We hypothesize a positive relation between growth rates and the incidence of restatement.

The logistic regression results are reported in Table 3.4. Consistent with the findings of Abbot *et al*. (2004) and Agrawal and Chadha (2005), a restatement is less likely for firms whose audit committee has at least one director with financial expertise (p-value < 0.05 for both models). The likelihood of restatement is significantly negatively related to outside blockholder ownership (p-value < 0.05 for both models). This is consistent with the argument of Shleifer and Vishny (1986) and Beasley (1996) that large outside blockholders have greater incentives to monitor managers. The likelihood of restatement is also significantly negatively related to management stock ownership (p-value < 0.05 for both models). This evidence is consistent with the view of Jensen and Meckling (1976) that higher management stock ownership motivates management to increase firm value therefore reducing the agency problems between management and shareholders. The incidence of restatement is lower for firms whose external auditor is a Big 5 auditing firm (significant at 1% level). Thus, the audit quality provided by Big 5 auditors is better at lowering the likelihood of restatement. The incidence of restatement is higher for firms with higher leverage ratios. This is consistent with Dechow *et al*. (1996) who argue that the leverage ratio is a proxy for demand for external financing which may explain why highly levered firms

tend to manipulate earnings to raise external financing at lower cost. Sales growth is positively related to the incidence of restatement, but only marginally significant at the 10% level for both models. This is weakly consistent with the result of Young *et al*. (2008). The likelihood of restatement is higher but not statistically significant for firms who have a lower proportion of unrelated directors and whose CEOs are also the chair of their boards. Contrary to the finding of Agrawal and Chadha (2005), the likelihood of restatement is not significantly higher for firms whose CEO belongs to the founding family.

[Please insert table 3.4 about here.]

3.5 FINANCIAL RESTATEMENTS AND TURNOVER

3.5.1 Univariate Analysis

Table 3.5 reports the summary statistics on the turnover rates for restating and control firms. The sample sizes for CEO, President, Board Chair, and CFO turnover rates are smaller since some firms do not have individuals that occupy positions with those titles. The CEO turnover rate for restating firms and control firms is 0.337 and 0.160 in years (1, 2), respectively, and their difference is statistically significant (p-value < 0.01). The higher turnover rate for restating firms over two years mainly occurs in year +1. By one year after the restatement announcements, 25.2% and 8.6% of the CEOs turn over in restating and control firms, respectively. The CEO turnover rates are not statistically higher for restating firms than control firms during the second year after the restatements announcements. Similarly, the turnover rates of Presidents and CFOs are significantly higher for restating firms, compared with control firms in years +1 and (1, 2). The Board Chairs turnover rates are higher (significant at the 10% level) for restating firms than control firms in year +1, but not significantly higher in year +2 and (1, 2). Turnover rates of individuals holding the top three positions for restating and control firms are 0.339 and 0.161 in year +1, and 0.435 and 0.333 in year (1, 2), respectively. The differences are significant at the 1% and 10% levels, respectively. Restating firms also experience (not significantly) higher turnover

rates for unrelated directors and audit committee members. The external auditor turnover rate is significantly higher (p-value < 0.01) for restating versus control firms in years +1, +2 and (1, 2).

[Please insert table 3.5 about here.]

3.5.2 Logistic Regressions

We perform a multivariate analysis to examine the turnover of executives and external auditors to control for the other factors that could affect turnover. The following logistic regression is estimated:

TURNOVER=f(RESTATE, PUNRELDIR, BODSIZE, CEOCHAIR, ROA, CAR) (3.2)

where TURNOVER is a dummy variable that is equal to one if a person who holds a senior position (CEO, President, Board Chair, CFO, unrelated director, audit committee) leaves the firm or the external auditor changes within twelve or twenty-four months following the restatement announcements. RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero if the firm is a control firm. We include a variable PUNRELDIR, which is the proportion of directors who are unrelated, as Jensen (1993) argues that top executive removal is less difficult with higher representation of outside directors on the board. Agrawal and Cooper (2007) also argue that outside directors could prevent auditors from being fired when questioning management. We hypothesize a positive (negative) relation between management (external auditor) turnover and the proportion of directors who are unrelated. Yermack (1996) argues that smaller boards are more effective. Thus, we hypothesize a negative (positive) relation between management (external auditor) turnover and the number of directors on the board (BODSIZE). CEOCHAIR is a dummy variable that is equal to one if the CEO is also the Board Chair and zero otherwise. Beasley (1994) and Dechow *et al*. (1996) argue that the board is less effective in monitoring when the CEO is also the Board Chair. We hypothesize a negative (positive) relation between management (external auditor) turnover and CEOCHAIR. Following Desai *et al*. (2006), we include the firm's return on assets (ROA) in the fiscal year prior to the restatement

announcement as a measure of prior performance. We hypothesize a negative relation between management (external auditor) turnover and ROA. Similar to Agrawal and Cooper (2007), CAR is the cumulative abnormal return over days [-5, 5] around each restatement announcement.[27] We hypothesize a negative relation between management (external auditor) turnover and abnormal returns based on the finding of Warner *et al*. (1988) who show that poor stock performance increases the probability of management changes.

The logistic regression results are reported in Table 3.6. Panel A provides the results when the independent variable is the executive or auditor turnover within one year after the restatement announcements. Consistent with the univariate results, the coefficients of RESTATE are positive and significant (*p*-value < 0.01) for all the turnovers. This suggests that restatement announcements are significantly related to turnover of executives and auditors even after controlling for other determinants of turnover. However, turnover is not significantly related to the proportion of unrelated directors, board size and when the CEO is also the Board Chair. The return on assets (ROA) is significantly and negatively related to executive but not auditor turnover. As expected, the cumulative abnormal return (CAR) is significantly and negatively related to CEO, President, top three executives and CFO turnovers. Based on untabulated results, restatement announcements are not associated with a higher turnover of Board Chairs. Unlike

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[27] The abnormal return (AR) is calculated using the following dual-beta market model:

$$R_{it} = \alpha_i + \beta_1 R_{mt} + \beta_2 R_{mt} D_1 + \sum_{j=-5}^{5} \gamma_{ij} D_{2j} + \varepsilon_{it}$$

where R_{it} is the excess return on stock *i* for trading day *t*, and is equal to the return for stock *i* minus the Canadian one-month T-bill rate, R_{mt} is the excess return for the market, where the market return is proxied by the return on the S&P/TSX Composite Index, D_1 is a dummy variable equal to one on and after the restatement announcement and zero otherwise to account for the possibility that the beta of the firm might change due to the restatement announcement, D_{2j} is the event dummy variable equal to one for stock *i* for day *j* in the event window that covers the eleven days centered on the restatement announcement and zeros otherwise. The ARs are estimated using 250 trading days before and 100 trading days after the announcement day.

Srinivasan (2005), we find no evidence that unrelated directors and audit committee turnover are related to the restatement announcements.[28]

Panel B of Table 3.6 reports the results when the independent variable is executive or auditor turnover within two years after the restatement announcements. Restatement announcements are associated with greater CEO, President, CFO and external auditor turnover, but not for turnover among the top three executives. Firms whose CEO is also the Board Chair experience higher CEO and President turnovers. The ROA is significantly and negatively related to both executive and auditor turnover. The CAR is only significantly and negatively related to CEO, President and top three executives turnovers within two years following the restatement announcements. Overall, the results in Panel B are similar to the results in Panel A of Table 3.6.

[Please insert table 3.6 about here.]

3.5.3 Univariate Analysis for Turnover Changes after SOX

Hennes *et al*. (2008), Collins *et al*. (2009), Burks (2010), Wang and Chou (2011) examine whether the likelihood of management turnover changes after the passage of the Sarbanes-Oxley Act of 2002 (SOX). They argue that if SOX changes the governance environment by enhancing the accountability of management for financial reports, then disciplinary actions against management following restatements should be more severe in the post-SOX period. Since our sample covers 1997 to 2006, it provides a natural experimental setting to test the impact of SOX on management turnover. Panel A of Table 3.7 provides descriptive statistics for restating firms in the pre- and post-SOX periods. The pre-SOX period is January 1, 1997 to July 30, 2002, and the post-SOX period is August 1, 2002 to December 31, 2006. The size of the restatement is measured as the cumulative impact of restatements on net income, scaled by total assets in the fiscal year prior to the restatement announcements. CAR is the cumulative abnormal return over

[28] The results for unrelated director and audit committee turnover are untabulated as they are similar to those for the univariate analysis.

the restatement event window [-5, 5]. The mean size of restatement is -0.066 in the pre-SOX period and -0.013 in the post-SOX period. However, the differences-in-mean based on unequal variances are not statistically significant. The mean CAR is -0.12 in the pre-SOX period and -0.05 in the post-SOX period. The post-SOX restatements have marginally significant less negative abnormal returns. This is consistent with Hennes *et al*. (2008), Collins *et al*. (2009) and Burks (2010) that the incidence of relatively benign restatements may have increased in the post-SOX period.

Panel B of Table 3.7 reports the differences in turnover rates between the pre- and post-SOX period. Turnover is equal to one if the management, directors, or auditors leave or are terminated twenty-four months after the restatement announcements. CEO and CFO turnover rates for restating firms are significantly higher than for control firms in both the pre- and post-SOX period. The turnover rates for President for the restating firms are significantly higher in the pre-SOX period and marginally higher in the post-SOX period than for the control firms. In contrast, Board Chair and top executives have significantly higher turnover rates for restating firms than for control firms in the pre-SOX period, but not in the post-SOX period.

[Please insert table 3.7 about here.]

3.5.4 Multivariate turnover analysis controlling for the impact of SOX

We conduct a multivariate analysis to examine the impact of the Sarbanes-Oxley Act of 2002 on turnover using the following logistic regression:

$$\begin{aligned} TURNOVER = {} & \beta_0 + \beta_1 RESTATE + \beta_2 POSTSOX + \beta_3 RESTATE * POSTSOX \\ & + \beta_4 PUNRELDIR + \beta_5 BODSIZE + \beta_6 CEOCHAIR + \beta_7 ROA + \varepsilon \end{aligned} \tag{3.3}$$

where TURNOVER is a dummy variable that is equal to one if the person who holds the position (CEO, President, CFO) leaves the firm within twenty-four months following the restatement announcement. RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero otherwise. POSTSOX is a dummy variable that is equal to one if the restatement is

announced in the post-SOX period, and zero otherwise. The interaction term RESTATE*POSTSOX allows us to examine whether the sensitivity of turnovers to restatement announcements has changed in the post-SOX period. If the passage of SOX has increased the accountability of executives, disciplinary actions should be more severe so that the positive relation between turnover and restatements should be strengthened in the post-SOX period. We hypothesize a positive coefficient for β_3. The other control variables are as defined in section 3.5.2.

The regression results are reported in Table 3.8. Consistent with the univariate results, the coefficients of RESTATE are positive and significant ($\beta_1 > 0$, p-value < 0.02) for all the turnovers (except for President turnover with a p-value = 0.10). Consistent with Arthaud-Day *et al*. (2006), Agrawal and Cooper (2007) and Collins *et al*. (2009), restatement announcements are significantly related to turnover of executives in the pre-SOX period even after controlling for other determinants of turnover. In the post-SOX period, summing the estimated coefficients of RESTATE and RESTATE*POSTSOX ($\beta_1 + \beta_3$) gives the estimates of 0.7388, 0.5256, 0.1045, and 0.6429 for CEO, President, Top executives and CFO, respectively. Consistent with the univariate results, the sums are significantly different from zero for CEO (p-value = 0.02), President (p-value = 0.10), CFO (p-value = 0.02), but not for top executives (p-value = -0.70). The results indicate that CEO, CFO (and President) turnovers are significantly (marginally significantly) related to restatement announcements in the post-SOX period. None of the estimated coefficients of POSTSOX (β_2) are significant, suggesting that the likelihood of executive turnover does not change after SOX. To determine whether the sensitivity of turnover to restatement announcements has changed in the post-SOX period, we examine the estimated coefficients of RESTATE*POSTSOX (β_3). None of the coefficients are significant except for top executives (p-value = 0.07). Consistent with Collins *et al*. (2009) and Burks (2007), the sensitivities of CEO, President and CFO turnover to restatements do not change in the post-SOX

period. In contrast to our hypothesis, the sensitivity of the turnover of top executives to restatements has marginally decreased in the post-SOX period.

In addition, management turnover is not significantly related to the proportion of unrelated directors (PUNRELDIR) or board size (BODSIZE). When the CEO is also the Board Chair, the likelihoods of CEO and President turnovers are lower. As expected, the return on assets (ROA) is significantly and negatively related to CEO, President and top executives turnovers but not to CFO turnover.

[Please insert table 3.8 about here.]

Burks (2007) argues that one reason for not finding an increase in the sensitivity of turnover to restatement announcements in the post-SOX period is the decrease in the severity of restatements after SOX. Similarly, Collins *et al*. (2009) argue that the impact of the Sarbanes-Oxley Act on CFO turnover may depend on the severity of the restatement. The two measures used as the proxies for the severity of restatements is size of the restatement (RESTATESIZE) and the cumulative abnormal return (CAR) over the event window [-5, 5]. Given that there is no evidence of increased sensitivity of CEO, President and CFO turnover to restatements after SOX and the severity of restatements measured by CAR has (marginally) decreased after SOX, we run the following logistic regression to examine the impact of the severity of the restatements on the executive turnover related to restatement announcements controlling for other determinants of turnover as in equation (3.3):

$$TURNOVER = \beta_0 + \beta_1 POSTSOX + \beta_2 RESTATESIZE \text{ or } CAR + \beta_3 RESTATESIZE * POSTSOX \text{ or } CAR * POSTSOX + \beta_4 PUNRELDIR + \beta_5 BODSIZE + \beta_6 CEOCHAIR + \beta_7 ROA + \varepsilon \quad (3.4)$$

The coefficients of POSTSOX measure whether the sensitivity of turnover to restatements changes in the post-SOX period, controlling for restatement severity and other determinants of turnover. The coefficients of the interaction terms, RESTATESIZE*POSTSOX and CAR*POSTSOX, measure whether the sensitivity of turnover to restatement severity changes in the post-SOX period. We hypothesize a positive (negative) coefficient for $\beta_{2,}$ respectively,

implying that larger restatement magnitude and more negative abnormal returns increase the likelihood of executive turnover.

The logistic regression results are reported in Table 3.9. Similar to Table 3.8, the controls for unrelated directors and board size are insignificant. CEOCHAIR is positively related only to CEO and President turnover. ROA is negatively related to turnover with the exception of CFO turnover. In contrast to our hypothesis, the coefficients of RESTATESIZE are insignificant, suggesting that the size of the restatements does not increase the likelihood of executive turnover in the pre-SOX period. The coefficients of CAR are (marginally) significant for CFO and CEO turnover (*p*-values = 0.07 and 0.04, respectively). This indicates that more negative abnormal returns are only associated with a higher likelihood of CEO and CFO turnover in the pre-SOX period, but not for President and top executives turnover. Consistent with Burks (2007) and Collins *et al*. (2009), the coefficients of POSTSOX is insignificant for CEO, top executives, and CFO, indicating that sensitivity of turnover to restatement in the post-SOX period does not increase even after controlling for the decrease in the severity of restatements. However, the coefficient of POSTSOX is negative and significant for President turnover, which suggests the decline in the severity of restatements contribute to the decline in the President turnover in restating firms after SOX. None of the coefficients of RESTATE*POSTSOX and CAR*POSTSOX are significant. The results imply that sensitivity of turnover to restatement severity does not change in the post-SOX period.

[Please insert table 3.9 about here.]

3.6 CHANGES IN GOVERNANCE FOLLOWING FINANCIAL RESTATEMENTS

Farber (2005) finds that firms who manipulate their financial statements and are detected subsequently take actions to improve their governance. Although such firms have worse governance compared to control firms prior to fraud detection, they have similar proportions of outside directors and proportions with combined Board Chair and CEO position to the control

firms three years after fraud detection. Similarly, Desai *et al*. (2006) document an increase in the proportion of outside directors and the ownership of blockholders following restatements.

We now examine whether governance characteristics change following our sample of restatement announcements. The post-announcement governance variables are obtained from the second proxy statement issued after the announcements. Table 3.10 reports the univariate analysis of changes in governance for 145 pairs of sample and control firms. Both board size and audit committee size change insignificantly (increase and decrease) for sample firms and control firms following the restatements, respectively. The numbers of unrelated directors and unrelated audit committee members increase significantly for sample firms and insignificantly for control firms. The proportion of unrelated directors increases significantly from 67 to 70 percent for both sample and control firms in the post-announcement period. The mean blockholder ownership also increases significantly from 11 to 13 percent for sample firms, and insignificantly for control firms. The percent of the firms whose CEO is also the Board Chair decreases insignificantly from 33 percent to 28 percent for the restatement sample, and decreases significantly from 41 percent to 34 for control firms, respectively. Based on the last column of Table 3.10 there are no significant differences between sample and control firms following the restatement announcements. In sum, the results suggest that restating firms experience increases in both the number and the proportion of unrelated directors and unrelated audit committee members, and in blockholder ownership in the post-announcement period. This indicates that consistent with Farber (2005) and Desai *et al*. (2006), restating firms try to improve their governance after the restatement announcements.

[Please insert table 3.10 about here.]

3.7 CONCLUSION

This chapter examines the governance of Canadian firms who announced restatements during the 1997-2006 period. We find that firms are less likely to restate their financial statements when

they have bigger blockholder and management ownership, a lower leverage ratio, and an audit committee that includes at least one director with financial expertise, or an external auditor that is a big 5 auditing firm. We find no evidence that the likelihood of restatement announcements is higher for firms with a lower proportion of unrelated directors, or whose CEO is also the Board Chair or belongs to the founding family.

Using logistic regressions that control for other determinants of turnover, we find that the turnovers of the CEO, President, top executives, CFO and external auditor are significantly higher compared to industry and size-matched control firms within 24 months following the restatement announcements. However, we do not find restatement announcements are related to the turnover of the Board Chair, unrelated director and audit committee membership. Although the CEO, President, and CFO turnover are still positively related to restatements in the post-SOX period, we find no evidence that the passage of Sarbanes-Oxley Act of 2002 increases the likelihood of turnover rates following restatement announcements.

We also investigate the changes in governance for restating firms following the announcements. We document an increase in the number and proportion of unrelated directors and unrelated audit committee members as well as blockholder ownership in the post-announcement period. In addition, the governance characteristics of restating firms are similar to control firms following the announcements. The results provide evidence that restating firms try to improve their governance and restore their reputation after restatement announcements.

CHAPTER FOUR

CANADIAN FINANCIAL RESTATEMENTS AND EXECUTIVE COMPENSATION

4.1 INTRODUCTION

Much of the prior literature, starting with Jensen and Meckling (1976), finds that executive compensation using stock options aligns the incentives of managers with those of shareholders. This literature finds that the asymmetric payoffs from stock options reduces agency costs for firms with high growth opportunities by encouraging them to take risk (Smith and Watts, 1992; Baber *et al*., 1996), option granting maximizes firm value (Core and Guay, 1999; Rajgopla and Shevlin, 2002), positive stock returns are associated with announcements of long-term managerial compensation plans (Brickley *et al*., 1985), and positive future payoffs are associated with stock options (Hanlon *et al*., 2003).

On the other hand, several studies challenge the use of stock options. Bebchuk *et al*. (2002) argue that executives have considerable power to influence their own pay and they use that power to extract rents. In addition, the desire to camouflage rent extraction might lead to the use of inefficient pay arrangements that provide suboptimal incentives and therefore reduce shareholder value. Bar-Gill and Bebchuk (2003) and Goldman and Slezak (2006) show that stock-based compensation provides incentives for managers to manipulate information in order to increase the value of a firm's stock.

Prior studies that examine the link between stock-based compensation and accounting fraud or financial restatements have primarily focused on CEOs and top executives (Erickson *et al*., 2006; Burns and Kedia, 2006; Efendi *et al*., 2006; Johnson *et al*., 2009). In contrast, Baranowski (2010) studies the relation between restatements and certain risk factors; namely, the value (not sensitivity) of backdated CFO stock options and material internal control weakness. Feng *et al*. (2011) examine the reasons why CFOs are involved in material accounting manipulations using

data from Accounting and Auditing Enforcement Releases (AAERs) issued by the SEC, and not financial restatements.

Canada provides an ideal alternative laboratory for examining the impact of corporate restatements on executive compensation given its similarities and differences with the U.S. Both countries share similar legal, institutional and regulatory environments, including corporate governance mechanisms and minority shareholder protections but not regulatory enforcement. However, Canadian public companies differ from their U.S. counterparts in that the percentages of Canadian public firms with controlling shareholders (concentrated ownership), families as the ultimate controlling shareholders, and issued restricted or subordinated voting shares and pyramidal structures are higher (e.g., Gadhoum *et al.*, 2005; Gadhoum, 2006; King and Santor, 2008). Since family-controlled firms, for example, are more likely to use dual-class shares as a means to separate ownership from control, this separation of ownership from control can create additional agency costs (Bebchuk *et al.*, 1999).

Thus, we extend the previous (primarily U.S.) studies by examining whether the incentives from stock options, restricted stocks, equity holdings and the long-term incentive payouts for top executives (including CEOs and CFOs) are associated with a higher likelihood of restatement for firms listed on the Toronto Stock Exchange (TSX). To the best of our knowledge, we are the first to examine the relation between financial restatements and equity-based compensation incentives from a Canadian perspective to further test the robustness of inferences drawn primarily for U.S. restatement announcements.

We investigate a sample of 146 Canadian firms who announced restatements over the period of 1997-2006 and 146 matched control firms using a novel, hand-collected dataset of executive compensation. We measure option sensitivity as the change in the value of stock options from a 1% change in stock price. Consistent with Erickson *et al*. (2006), we do not find that firms are more likely to restate their financial statements when the sensitivity of total, vested and unvested option values are higher for top executives, CEOs and CFOs. Incentives from equity, restricted stocks

and long-term incentive payouts are not associated with the incidence of restatements for top executives, CEOs and CFOs, which is consistent with Burns and Kedia (2006). In contrast to Efendi *et al*. (2007), we do not find that restatements are more likely for firms that have higher in-the-money stock options.

Using an ordinal logistic regression to control for different prompters of restatements,[29] we find that total, vested and unvested option sensitivities are not related to the incidence of restatements due to accounting malfeasance. Except for the equity holdings of CEOs, restricted stock, equity holdings and long-term incentive payouts are not associated with the likelihood of restatements due to accounting malfeasance for top executives, CEOs and CFOs.

We examine whether option sensitivity is related to the size of the restatements measured as the cumulative impact of restatements on net income. The results indicate that option sensitivities for top executives, CEOs and CFOs have no effect on the size of the restatements. We find that incentives from restricted stock are related to the size of restatements for top executives, CEOs and CFOs, and that higher CFO equity holdings are related to larger restatements.

In addition, we do not find any evidence that firms raising more long-term debt and equity capital are more likely to misreport financial results in order to reduce the cost of external financing. In contrast to Johnson *et al*. (2009) and Erickson *et al*. (2006), top executives, CEOs and CFOs at restating Canadian firms do not exercise more options during the first year restated than their counterparts at control firms. However, we find that top executives and CEOs exercise more options during the first year restated when the magnitudes of the restatements are larger.

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[29] The ordered logistic regression or proportional odds model is a regression model for ordinal or dichotomous dependent variables, allowing for more than two (ordered) response categories such as bond ratings. The model only applies to data that meet the assumption that the relationship between any two pairs of outcome groups is statistically the same. Thus, the coefficients that describe the relationship between, for example, the lowest versus all higher categories of the dependent variable are the same as those that describe the relationship between the next lowest category and all higher categories of the dependent variable, and so forth.

Our results provide guidance on designing compensation packages for executives. The compensation committee needs to find a balance between an increase in incentives to misstate financial results and the alignment of the interests of executives and shareholders. Our results should also be of interest to regulators in formulating disclosure regulations to minimize the occurrence of financial restatements.

The remainder of this chapter is organized as follows. Section 4.2 provides a brief review of the prior literature. Section 4.3 develops the hypotheses. Section 4.4 discusses the data and our sample selection. Section 4.5 investigates the link between executive incentives and the likelihood of restatements. Section 4.6 analyzes the option exercises around with financial restatements. Section 4.7 concludes the paper.

4.2 PRIOR LITERATURE

Because of potential conflicts between managers and shareholders, one should link shareholder wealth with managerial compensation in order to reduce agency costs (Jensen and Meckling, 1976). One way to achieve this is to use equity compensation as suggested by the literature on optimal contracting (Core *et al*., 2003)**.** The use of stock options is usually viewed as a means to align the interests of shareholders with those of managers. Smith and Stulz (1985) argue that stock option compensation makes a manager's wealth a convex function of firm value such that a manager's risk aversion might be alleviated.

However, equity-based compensation can also have a negative impact. Jensen (2005) argues that overvalued stocks may lead to agency problems and stock-based compensation may exaggerate the problem because it encourages managers to engage in aggressive accounting to take advantage of short-run equity gains. Bergstresser and Philippon (2002) find higher levels of earnings management at a firm where the overall compensation of the CEO is closely tied to stock prices. Bebchuk and Fried (2003) show that equity ownership creates incentives for

managers to choose projects that are less transparent or to move to reduce the transparency of existing projects.

Using 43 events of fraud from 1992 to 2001, Johnson *et al*. (2009) find that executives at such firms have greater incentives to misrepresent if they hold unrestricted stocks than do executives at matching firms. However, they do not find that such firms have greater incentives to commit fraud based on their holdings of restricted stocks, vested and unvested stock options. Based on their examination of executive incentives of firms accused of accounting fraud during 1996 and 2003 by the Securities and Exchange Commission (SEC) in their Accounting and Auditing Enforcement Releases (AAERs), Erickson *et al*. (2006) conclude that executive equity incentives are not associated with accounting fraud.

Two papers examine the relation between CEO compensation and the likelihood of financial restatements. Burns and Kedia (2006) find that the sensitivity of CEO option values to stock prices is positively related to the likelihood of financial misstatement over the period of 1995-2002. They do not find a significant relation between other components of CEO compensation (such as equity, restricted stocks, long-term incentive payouts, and salary plus bonus) and the propensity to misreport. Efendi *et al*. (2006) extend the study by Burns and Kedia (2006) by investigating whether in-the-money options provide additional incentives to misreport. They find that the likelihood of financial restatements is positively related to the value of the in-the-money stock options held by CEOs, the firm's interest-coverage ratio and whether the firm undertakes external financing. Given the link between earnings restatements and stock-based compensation, Cheng and Farber (2008) investigate whether restating firms recontract with their CEOs to reduce option-based compensation. Their results suggest that the proportion of the value of option grants over total compensation decreases in the two years following the restatement. The reduction in option-based compensation leads to a decrease in the riskiness of investment and therefore an increase in firm performance.

Baranowski (2010) examines the relation between restatements due to stock option backdating and certain risk characteristics. He finds that firms that restate due to option backdating have more material internal control weaknesses than control firms. He finds no evidence that CFO option values are related to the likelihood of restatement due to option backdating. Feng *et al*. (2011) examine why CFOs become involved in material accounting manipulations using Accounting and Auditing Enforcement Releases (AAERs).Their findings are consistent with the explanation that CFOs are involved in material accounting manipulations because of pressure from CEOs and not from them seeking immediate personal financial gain from equity incentives.

4.3 HYPOTHESES

Burns and Kedia (2006) argue that option compensation makes CEO wealth a convex function of stock price. As a result, a CEO benefits from an increase in the stock price due to misstated financial statements. The loss to a CEO in the event of a declining stock price is limited because a CEO will choose not to exercise the options if they are not in-the-money. Cheng and Warfield (2005) suggest that managers with high equity incentives are more likely to engage in earnings management to increase the price of the stocks when sold. Therefore our first hypothesis, stated in its alternative form, is as follows:

H_A^1 : The incentives from stock options are positively related to the likelihood of restatements.

Stock options usually have a vesting period of three to five years, during which a proportion of the shares in the options are exercisable. Firms typically grant stock options each year, so the executives for any specific year hold a combination of vested and unvested options. Since executives can exercise vested options during periods of misstatements, our second hypothesis, stated in its alternative form, is as follows:

H_A^2: The incentives from vested options are positively related to the likelihood of restatements.

Other components of executive compensation, such as restricted stocks, equity and long-term incentive payments, also link an executive's wealth to stock prices. Unlike stock options, executives will bear the cost of misstating the financial results since significant negative returns are associated with the announcement of financial restatements (Dechow *et al.*, 1996; Anderson and Yohn, 2002; Palmrose *et al.*, 2004). Burns and Kedia (2006) argue that long-term incentive payouts lengthen the executive's time horizon by making their wealth a function of longer-term firm performance. Our third hypothesis, stated in its alternative form, is as follows:

H_A^3: The incentives from equity, restricted stocks and long-term incentive payouts are not related to the likelihood of restatements.

The cost of new capital raised externally depends on a firm's financial performance. This provides an incentive to misreport financial results. Dechow *et al.* (1996) and Richardson *et al.* (2003) find that an important reason for earning manipulations is the desire to attract low-cost external financing. Our fourth hypothesis, stated in its alternative form, is as follows:

H_A^4: Restating firms are more likely to raise long-term debt and equity than control firms.

4.4 SAMPLE AND DATA

Restatement announcements for Canadian companies are identified using searches of Lexis-Nexis News Wires for the ten-year period from January 1997 to December 2006. Key word searches are performed using "restate," "restates," "restated," "restating," or "restatement" as well as other variations such as "adjust" and "amend" and "revise" within 50 words of "financial statement" or "earnings." Restatement announcements are excluded if they result from

discontinued operations, stock splits, stock dividends, mergers and acquisitions,[30] changes in business segment definitions, changes made for presentation purposes, and changes in currency of reporting (for example, converting from Canadian to U.S. dollars). Restatements due to changes in accounting policy also are excluded as a general rule because they represent normal corporate activities which do not involve accounting fraud or errors.[31]

Our initial sample consists of 231 restatement announcements for firms listed on the Toronto Stock Exchange (TSX). The sample is reduced to 180 restatements after eliminating six firms with insufficient daily stock returns and closing prices in the Canadian Financial Markets Research Center (CFMRC) database, four firms with simultaneous trading halts and subsequent delistings, eighteen income funds, fifteen firms with multiple restatement announcements during the 250 trading days used for analysis purposes, and eight firms with unavailable proxy statements or with first proxy statements filed in the System for Electronic Document Analysis and Retrieval (SEDAR) whose dates follow the restatement announcements. We also exclude thirteen firms in the financial industry (SIC 60-67) since the interpretation of their ratios are different from other firms and their corporate governance is different due to regulation (Efendi *et al*., 2007). This reduces the sample to 167 restatements.

Following Agrawal *et al*. (1999), Agrawal and Chadha (2005) and Young *et al*. (2008), we match each restating firm with a unique control firm that (1) has the same two-digit Compustat primary Standard Industrial Classification (SIC) industry code,[32] (2) has the closest market

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[30] For example, a firm restates its financial statements after completion of a merger where the merger was accounted for as a pooling of interests. We exclude this type of restatement because it is not associated with accounting fraud or error.

[31] We exclude firms adopting new accounting recommendations by the Canadian Institute of Chartered Accountants (CICA), Financial Accounting Standards Board (FASB) or the Emerging Issues Task Force (EITF). However, we include restatement announcements resulting from SEC clarifications of revenue recognition in financial statements (SEC Staff Accounting Bulletin No. 101) and lease accounting for operating lease (Feb.7, 2005, letter from SEC's Chief Accountant to American Institute of Certified Public Accounts clarifying SEC staff's interpretation of certain accounting issues and their application under GAAP relating to operating leases). To our knowledge, there are no restatements resulting from the changes of Canadian regulations.

[32] We use Bloomberg or Factiva to obtain any missing SICs for restating firms.

capitalization to the restating firm at the end of the fiscal year before the announcement year,[33] and (3) did not announce any restatement during the period 1997 to 2006. A replacement firm is selected if the control firm announced a restatement within the sample period. We add an additional requirement that the match firm has disclosure about executive compensation in the proxy statements available in SEDAR to calculate executive compensation sensitivity. Market capitalization is measured as the monthly closing price times the number of shares outstanding, both of which are obtained from CFMRC. The procedure produces our final sample of 146 sample firms and 146 control firms.

The financial data for restating firms and control firms are obtained from the Compustat database. Missing data with the exception of sales growth are obtained from Mergent online or from the financial statements filed with SEDAR. The executive compensation variables are hand collected from the proxy statements at the year-end before the first year that was restated. The variables that are reported in U.S. dollars are converted into Canadian dollars using the I/B/E/S Daily Exchange Rate.

Summary characteristics for the restating firms differentiated by the reason for the restatement, the party initiating the restatement and industry groups based on primary two-digit SIC codes are reported in Panels A, B, and C of Table 4.1. Because some firms report multiple reasons for their restatements, the total number of reasons reported in Panel A exceeds the total sample size. Cost or expense is the most common reason (26.1%), followed by other (21.2%) and revenue recognition (18.8%). The frequencies differ from those reported for U.S. restatements (e.g., Anderson and Yohn, 2002; Palmrose *et al.*, 2004; Hribar and Jenkins, 2004), where revenue recognition is the largest restatement category. Based on Panel B of table 4.1, the restatement initiators are unknown for 43.2% of the reinstatements, followed by company-initiated restatements for 34.9% of the reinstatements. Based on Panel C of table 4.1, 37.7% of the firms

[33] For six restating firms who started trading on the TSX later than the end of the fiscal year before the year of the restatement announcements, the match date is the first trading month in the CFMRC.

are in manufacturing, followed by 25.3% and 21.2% of the firms in mining and services, respectively. There are no financial restatements by firms in Agriculture, forestry, and fisheries, and construction. Based on Panel D of table 4.1, the mean sample firms restate more than one year of financial statements (mean=1.48). The magnitude or size of the restatements is measured as the cumulative effect of restatement on net income. It is calculated as the restated income (loss) less originally reported income (loss) over the restated period. This data are collected from the financial statements and the restatement announcements. The restatements, on average, reduce the annual net income by 438.52 million dollars. The size of a restatement is scaled by the total assets in the year prior to the restatement announcement. On average, restatements represent about 3% of total assets.

The restating firms are classified into five mutually exclusive groups for their financial constraint status using the algorithm by Hadlock and Piere (2010), whose details are provided in Appendix 4.1.[34] Based on Panel E of Table 4.1, 6.3% of the firms are not financially constrained (NFC), 23.8% of the firms are likely not financially constrained (LNFC), 58% of the firms are potentially financially constrained (PFC), 6.3% of the firms are likely financially constrained (LFC) and 5.6% of the firms are financially constrained.

[Please insert table 4.1 about here.]

4.5 EXECUTIVE INCENTIVES AND THE INCIDENCE OF RESTATEMENT

4.5.1 Measurement of Executive Incentives

We define stock option sensitivity as the change in the value of a stock option for a 1% change in stock price. Consistent with the literature, we use the following modified Black-Scholes model adjusted for dividend payout by Merton (1973) to value the stock options.

[34] Three firms are not classified because the first year restated is before 1997. As a result, their financial statements are not available in SEDAR.

$$Option\ Value = [Se^{-dT} N(Z) - Xe^{-rT} N(Z - \sigma T^{(1/2)})] \quad (4.1)$$

where $Z=[\log(S/X) + T(r-d+\sigma^2/2)]/\sigma T^{1/2}$; N is the cumulative probability function for the normal distribution; S is the price of the underlying stock; X is the exercise price of the option, T is the time-to-maturity of the option in years; *r* is the risk-free rate corresponding to the option's time-to-maturity; *d* is the natural logarithm of the expected dividend yield; and σ is the expected stock return volatility.

The stock price is the closing price at the fiscal year end before the first reporting year that is restated.[35] The Canadian Treasury bond average yield corresponding to the option's time-to-maturity is used as an estimate for the risk free rate. The bond yield is collected from the Canadian Socio-Economic Information Management System (CANSIM II). The average dividend yield (adjusted for stock splits) over the past three years prior to the first year that is restated is used as a proxy for the expected dividend yield. The expected stock return volatility is measured as the standard deviation of stock returns over 60 months prior to the first year restated.

For newly granted options, strike price and time to maturity are obtained directly from proxy statements. For previously granted options, the one-year approximation method of Core and Guay (1999, 2002) is used to estimate the strike price and the time to maturity. Time to maturity for unvested options is calculated as one year less than the time-to-maturity of the most recent year's grant (or nine years if no option is granted in the most recent year). Time to maturity for vested options is calculated as three years less than the time-to-maturity of unvested options (or six years if no option is granted in the most recent year). The average exercise prices for vested and unvested options are calculated as the year-end price minus the profit per option. Profit per option

[35] Quoted closing mid-spreads are used as the proxies for any missing closing prices.

is calculated as the realizable values disclosed in the proxy statement divided by the number of options at the fiscal year end.[36]

The sensitivity of the value of q stock option with respect to a 1% change in stock price is estimated as:

$$\partial(option\ value)/\partial(price)*(price/100)=e^{-dT}N(Z)*(price/100) \tag{4.2}$$

where $e^{-Dt}N(Z)$ is the partial derivative of the Black-Scholes value with respect to stock price (i.e., the option's delta); and all the other terms are as previously defined. The sensitivities of newly granted options, vested options and unvested options are estimated separately, and the sum of these three measures is the total option sensitivity.

Similar to Burns and Kedia (2006) and Erickson *et al*. (2006), the sensitivity of the value of stock and restricted stock is defined as the change in the value of these holdings for a 1% change in stock price. We assume that the delta of both restricted stock and stock is equal to one, which means that a one dollar change in stock price results in a one dollar change in the value of stock and restricted stocks. The sensitivity of stock (or restricted stock) is estimated by multiplying the number of shares of stock (or restricted stock) held by 1% of the stock price at the year-end before the first year that is restated.

The impact of payouts for Long-term Incentive Plans (LTIP) is measured as the LTIP payouts divided by total compensation. Total compensation is the sum of salary, bonus, other annual compensation, restricted stock grants, LTIP payouts, all other compensation and value of newly granted options using the modified Black-Scholes methodology.

[36] To avoid double counting the newly granted options, the number and realizable value of new options is deducted from the number and realizable value of unexercisable options. If the number of newly granted options exceeds the number of unexercisable options, the excess of the number and realizable value of the newly granted options over unexercisable options is deducted from the number and realizable value of exercisable options.

For top executives, the incentive variables are calculated as the average over the top five executives listed in the proxy statements.[37] If firms have co-CEOs or two CEOs (CFOs) during the transition period, the incentive variables are summed over the co-CEOs or two CEOs (CFOs).

4.5.2 Univariate Analysis

Table 4.2 presents the summary statistics of the financial variables for the restating and matched control firms. Both the median sales and total assets of control firms are significantly smaller than restating firms (*p*-value=0.09 and 0.00, respectively). The mean (median) leverage ratio is about 0.13 (0.06) for restating firms and 0.12 (0.03) for control firms. The mean (median) ROA is about -9.94% (-1.09%) for restating firms and -8.15% (0.36%) for control firms. However, we do not find that the restating firms are significantly more leveraged and have worse performance than control firms at the year-end prior to the first year that the financials are restated. Restating firms have a significantly higher mean sales growth rate (*p*-values=0.07) than control firms. Although restating firms, on average, raise more long-term debt than control firms, the difference is not statistically significant. Restating firms also raise more equity capital than control firms based on the median (*p*-value=0.06). Debt and equity funds raised is a dummy variable that is equal to one if the long-term debt and new equity raised during the first year restated exceeds 20% of total assets, and zero otherwise. Both the mean and median for this dummy variable are significant at the 5% level. Consistent with Efendi *et al*. (2007), restating firms issue more debt and equity funds than control firms during the first year restated. Restating firms have an insignificantly higher percentage of CEOs that are the chairs of their boards. Restating firms have the same percentage of CEOs belonging to the founding family as control firms. Consistent with Erickson *et al*. (2006), restating firms have significantly higher stock

[37] Erickson *et al*. (2006) use the aggregated incentive variables over the entire management teams. We use the mean values instead of aggregated values because restating firms may report different numbers of executives from control firms (see Johnson *et al*., 2005).

volatility than control firms (*p*-values for mean and median=0.01 and 0.03, respectively). Analyst following in number is obtained from I/B/E/S, and is assumed to be zero if the firm is not included in the I/B/E/S database. Restating firms are followed by more analysts (mean=4) than control firms (mean=2). Both the differences in the mean and median are statistically significant (*p*-values for mean and median=0.00 and 0.00, respectively).

[Please insert table 4.2 about here.]

Table 4.3 presents the descriptive statistics for executive compensation and incentive measures for the restating and control firms. Panel A reports the variables for top executives, measured at the year-end before the first restated year. The average salaries of top executives are $241,807 for restating firms, and $188,001 for the control firms. The difference in the means is marginally significant (*p*-value=0.07). Restating firms' top executives also have higher bonuses than their control firm counterparts. However, the differences are not statistically significant for both the mean and the median. The mean restricted stock grants for top executives at restating firms of $27,236 is significantly different from the $3,438 for control firms (*p*-value=0.06).

The option grant value is calculated using the modified Black-Scholes model adjusted for dividend payouts, where the number of options granted is taken from the proxy statements. The in-the-money option is the value that executives would have realized from exercising all vested and unvested options. Total compensation is the sum of salary, bonus, other annual, long-term incentive payouts, other compensation, option grant value and restricted stock grant value. Top executives at restating firms have higher values of granted options, in-the-money options, and total compensations than at control firms. However, none of the differences are statistically significant.

Total options sensitivity is the sum of newly granted stock options sensitivity, vested option sensitivity and unvested option sensitivity. Total sensitivity is the sum of total options sensitivity, restricted stocks sensitivity and equity sensitivity. The mean vested option sensitivity, unvested option sensitivity and total option sensitivity are insignificantly higher for top executives at

restating firms than at control firms. The mean restricted stock sensitivity of $158.0 for restating firms is significantly different (marginally) from the mean sensitivity of restricted stock of $20.6 for the control firms. Although equity sensitivity and total sensitivity for top executives are higher for control firms than restating firms, the differences are not statistically significant.

Panels B and C in Table 4.3 report summary statistics for the compensation and incentives variables for only CEOs and only CFOs, respectively. The number of observations for Panels B and C are lower than for Panel A due to the exclusion of firms where CEO or CFO compensations are not disclosed in the proxy statements. Similar to top executives, CEOs at restating firms have marginally higher mean salary (*p*-value=0.10), marginally higher restricted stock grants (*p*-values=0.08 and 0.06 for mean and median differences, respectively) and higher mean restricted stock sensitivities (*p*-value=0.09) than at control firms. The other compensation variables and incentive measures are not significantly different from each other. For CFOs, none of the variables is statistically significant.

[Please insert table 4.3 about here.]

4.5.3 Logistic Regression

In this section, we examine whether the differences in incentive measures are associated with the likelihood of restatement after controlling for other determinants. We estimate the following logistic regression:

$$\text{RESTATE}=f(\text{Total option sensitivity or Vested option sensitivity and unvested option sensitivity, Restricted stock sensitivity, Equity sensitivity, Long-term incentive plans (LTIP) payouts, Capitalraise, Volatility, CEOCHAIR, CEOFOUND, Leverage, Sales growth}), \quad (4.3)$$

where RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero if the firm is a control firm. We use the logarithmic transformation for the option incentive measures, because these measures increase at a decreasing rate with firm size according to Baker and Hall (1998) and Core and Guay (1999). Total option sensitivity is the natural logarithm of the

dollar change in the value of total stock options holdings, including newly granted options, vested options and unvested options, for a 1% change in stock price. Vested and unvested option sensitivity is the dollar change in the value of the holdings of vested and unvested options for a 1% change in stock price. Equity and restricted stock sensitivity is the dollar change in the value of equity and restricted stock holdings for a 1% change in stock prices. Long-term incentive payment is calculated as the long-term incentive payments divided by total compensation. All the incentive variables are measured in the year prior to the first year restated.

Capitalraise is a dummy variable that is equal to one if the long-term debt and new equity raised during the first year restated exceeds 20% of total assets, and zero otherwise. Firms may manipulate the earnings in order to attract low cost external funding (Dechow *et al*., 1996; Richardson *et al*., 2002). We hypothesize a positive relation between the amount of debt and equity raised and the incidence of restatement. Volatility is calculated as the standard deviation of stock returns over the 60 months prior to the first year restated. Firms operating in less predictable environments are more difficult to monitor, and therefore find it easier to commit financial fraud (Erickson *et al*., 2006). We hypothesize a positive relation between volatility and the likelihood of restatement. CEOCHAIR is a dummy variable that is equal to one if the CEO is also the Board Chair and zero otherwise. The board's monitoring function is less effective when the CEO is also the Board Chair (Jensen, 1993; Beasley, 1996; Dechow *et al*., 1996), so we hypothesize a positive relation between CEOCHAIR and the likelihood of restatement. CEOFOUND is a dummy variable that is equal to one if the CEO belongs to the founding family of the firm and zero otherwise. Dechow *et al*. (1996) argue that CEOs are less accountable to the board when they are also the company founders. We hypothesize that the likelihood of restatement is higher for firms with CEOs that belong to the founding family. Leverage is calculated as the ratio of total Long-term debt divided by total assets at the year-end before the first year restated. Leverage is a proxy for the firm's demand for external financing which may explain why earnings are manipulated to avoid debt covenant violations (Dechow *et al*., 1996).

We therefore hypothesize a positive relation between leverage and the likelihood of restatement. Sales growth is calculated as the compound growth rate of sales in the three years preceding the first year restated. Richardson *et al*. (2002) note that restatement firms are associated with high growth rates because they are under great pressure to inflate the earnings to meet expectations of analysts. We hypothesize a positive relation between growth rates and the incidence of restatement.

The logistic regression results are reported in Table 4.4. Panels A and B present the model results when the control variables are not included. Contrary to the first hypothesis and the results of Burns and Kedia (2006), total option sensitivities with respect to stock price for CEOs are not significantly positively related to the likelihood of restatements. We do not find any evidence that the total option sensitivity of top executives and CFOs are positively associated with the probability of restatements. In contrast to the second hypothesis and the findings of Burns and Kedia (2006), the incentives from vested options are not significantly related to the likelihood of restatements for top executives, CEOs and CFOs. Consistent with our third hypothesis, incentives from equity and long-term incentive payouts are not associated with the likelihood of restatements for top executives, CEOs and CFOs. However, restricted stock sensitivities are positively related to the incidence of restatements for top executives.

[Please insert table 4.4 about here.]

Panels C and D of Table 4.4 present the model results when the control variables are included. Even after controlling for other determinants, the incentives from total options and vested options are not associated with a higher likelihood to restate for top executives, CEOs, and CFOs. This is in contrast to our first hypothesis and the findings of Burns and Kedia (2006), but consistent with Erickson *et al*. (2006). We find no evidence that unvested option sensitivity is related to the likelihood of restatements. Restricted stock holdings, equity holdings and long-term incentive payouts are not associated with a higher likelihood of restatement. This is consistent with our third hypothesis and the findings of Burns and Kedia (2006). Consistent with the univariate

analysis, firms with higher stock return volatility (except for CEOs) and higher sales growth rates are more likely to restate. However, there is no evidence that more levered firms and those with the CEO also being the Chair of the Board or belonging to the founding family have a higher probability of restatements. In contrast to our fourth hypothesis, we do not find that restating firms are more likely to raise long-term debt and equity capital than control firms during the first year restated since none of the coefficients for dummy variable Capitalraise is significant.

4.5.4 Ordinal logistic regression

In the previous section, we do not distinguish the prompters (initiators) for all restatements. We now run a logistic regression using an ordinal dependent variable to control for the restatement severity since some of the restatements are voluntary while others are mandated by the regulator or auditor. Similar to Efendi *et al*. (2007), we define a firm having accounting malfeasance if either the regulator or auditor prompted the restatement. The ordinal dependent variable is equal to two if the firm has accounting malfeasance, one for all other restatements, and zero for control firms. The explanatory variables are the same as in the previous section.

The ordinal logistic regression results, which are reported in Table 4.5, are very similar to those in Table 4.4. The option sensitivities (total, vested and unvested) are not related to the incidence of restatements due to accounting malfeasance. Except for the equity holdings of CEOs, restricted stock, equity holdings and long-term incentive payouts are not associated with the likelihood of restatements due to accounting malfeasance for top executives, CEOs and CFOs. Firms with higher stock return volatilities (except for CEOs) and higher sales growth rates (except for CFOs) are more likely to be associated with restatements due to accounting malfeasance. More levered firms and those with the CEO as the Chair of the Board or belonging to the founding family are not related to the likelihood of restatements due to accounting malfeasance.

[Please insert table 4.5 about here.]

4.5.5 The impact of option sensitivity on the size of the restatement

Burns and Kedia (2006) find that misreporting earnings that are substantially restated is more likely to be associated with CEOs with large option sensitivity. Although we do not find a relation between the likelihood of restatement and option sensitivity, option sensitivity may still be related to the size of the restatements.

The size of a restatement is measured as the cumulative impact of a restatement on net income and is calculated as the restated net income less the originally reported net income over the restated period. The values are scaled by the total assets in the year prior to the restatement announcements. For control firms, the size of the restatement is zero. Thus, the dependent variable is the absolute value of the cumulative effect of a restatement on net income scaled by total assets. The regression results are reported in Table 4.6. None of the coefficients of total option sensitivity are significant for top executives, CEOs and CFOs. This suggests that option sensitivity has no impact on the magnitude of restatements. Similarly, we do not find that incentives from restricted stock are related to the magnitude of restatement for top executives, CEOs and CFOs. Although there is no evidence that incentives from top executives and CEO equity holdings are associated with the magnitude of restatement, we find large restatements are associated with higher CFO equity sensitivity.

[Please insert table 4.6 about here.]

4.6 OPTION EXERCISES

In this section, we examine exercise behavior for executive options. Panels A, B and C of Table 4.7 report the dollar values of options exercised and the ratios of the number of exercised options to total number of exercisable options during the first year restated for top executives, CEOs and CFOs, respectively. The mean value of options exercised for top executives at restating firms and control firms is 1,054,092.4 and 227,568.8, respectively, whose difference is not

significant. The top executives of restating firms exercise 91% of exercisable options compared to 9% for their counterparts at the control firms. However, the difference again is not statistically significant. The CEOs for restating firms have a marginally significant and higher mean value of options exercised and a higher percentage of exercised options to the total number of exercisable options (*p*-value=0.10 and 0.06, respectively). In contrast, the mean value of options exercised and ratio of exercised options to total number of exercisable options are not significantly different for CFOs at restating firms from those at control firms.

We now run a regression to control for the other factors that might affect option exercises. The dummy variable RESTATE is equal to one if the firm is a restating firm and zero if the firm is a control firm. The results are reported in Panel D of Table 4.7. The results suggest that the value of exercised options for top executives is positively related to the value of the in-the-money options and the magnitude of restatement. Consistent with Efendi *et al.* (2007), we also find that the value of exercised options for CEOs increases with the value of in-the-money options. Furthermore, we find that CEOs exercise more options when the magnitude of restatement is higher. The results also indicate that similar to top executives and CEOs, the value of options exercises increases with the value of in-the-money options for CFOs. CFOs also exercise more options when they have higher salaries. However, none of the coefficients for the dummy variable RESTATE are statistically significant for top executives, CEOs and CFOs. Our overall results suggest that consistent with Erickson *et al*. (2006), top executives, CEOs and CFOs at restating firms do not exercise more options than at control firms during the first year subsequently restated.

[Please insert table 4.7 about here.]

4.7 CONCLUSION

We examine the effects of executive equity incentives on the propensity to misstate financial statements for a sample of 146 firms listed on the Toronto Stock Exchange who announced

financial restatements during the period from 1997 to 2006 and for 146 control firms. We find that the likelihood of restatements is unrelated to the sensitivity of total, vested and unvested options for top executives, CEOs and CFOs. The incentives from equity, restricted stocks and long-term incentive payouts are not associated with the incidence of restatements for top executives, CEOs and CFOs. .

After controlling for the different prompters of restatements, we find the option sensitivities (total, vested and unvested) are not related to the incidence of restatements due to accounting malfeasance. Except for the equity holdings of CEOs, restricted stock, equity holdings and long-term incentive payouts are not associated with the likelihood of restatements due to accounting malfeasance for top executives, CEOs and CFOs.

We also find that option sensitivities for top executives, CEOs and CFOs have no effect on the magnitude of restatements. Similarly, incentives from restricted stock are unrelated to the magnitude of restatements for top executives, CEOs and CFOs. Higher CFO equity holdings are associated with bigger restatements.

In addition, we do not find any evidence that firms raising more long-term debt and equity capital are more likely to misreport financial results in order to reduce the cost of external financing. Top executives, CEOs and CFOs at restating firms do not exercise more options during the first year restated and have more holdings of in-the-money stock options than control firms. Top executives and CEOs also exercise more options during the first year restated when the magnitudes of restatements are higher.

CHAPTER FIVE

CONCLUSION

When a firm announces a restatement of its financial statements, market participants ask: What are the impacts of the restatements on stock prices, market microstructure and return volatility? Motivated by this question, the first essay studied the effects of Canadian financial restatement announcements on liquidity, spread components, (un)informed arrival rates, informed trading probabilities, analyst followings and earnings forecasts, price effects, residual return volatilities and their components, and price synchronicities over 1997-2006. The results are consistent with the hypothesis that information asymmetry increases after restatement announcements since the arrival rates of (un)informed investors, residual return volatilities and their permanent component and illiquidity increase significantly after restatement announcements. After controlling for spread determinants (such as price, volume and volatility), we found that both relative quoted and effective spreads increased in the announcement windows for the full sample, remained higher post-announcement, and were lower for U.S. cross-listed firms, and after the enactment of Sarbanes-Oxley in 2002. The spread-depth market quality index decreased during the announcement window and was higher for U.S. cross-listed firms. The negative abnormal returns associated with restatement announcements were significantly related to downward revisions in the consensus forecasts of earnings of analysts. More negative abnormal returns were associated with restatements involving revenue recognition problems and those initiated by the company. Total residual volatility and its information-based permanent component from a GARCH model with an asymmetric effect and the adverse selection spread component increased following restatement announcements. Thus, our findings support the overriding hypothesis that financial restatements diminish market quality and send two information signals to market participants. The first signal is that the future earnings prospects of the restating firms are diminished; and the second signal is that the uncertainty of future cash flows of the restating firms due to increased informational asymmetry has increased.

Given the negative impact of financial restatements on market quality, the second essay examined the corporate governance of Canadian firms that announced restatements during the 1997-2006 period. We found that the likelihood of financial restatements are lower when firms have bigger blockholder and management ownerships, a lower leverage ratio, an audit committee that includes at least one director with financial expertise, or an external auditor that is a big 5 auditing firm. However, the likelihood of restatement announcements is not higher for firms with a lower proportion of unrelated directors, or whose CEO is also the Board Chair or belongs to the founding family. Using logistic regressions that control for other determinants of turnover, we found that the turnovers of the CEO, President, top executives, CFO and external auditor are significantly higher compared to industry and size-matched control firms within two years following the restatement announcements. However, we do not find restatement announcements are related to a higher turnover of the Board Chair, unrelated directors and audit committee membership. Although the CEO, President, and CFO turnovers are still positively related to restatements in the post-SOX period, we found no evidence that the passage of Sarbanes-Oxley Act of 2002 increased the likelihood of turnover rates following restatement announcements. Evidence was also provided that restating firms try to improve their governance after restatement announcements as the number and proportion of unrelated directors and unrelated audit committee members as well as blockholder ownership increased after restatement announcements. Following the announcements, there was no significant difference in governance characteristics between restating firms and control firms.

We further investigated the reason why firms misstate their financial results despite the consequences that we found in the first two essays. Using stock options in designing executive compensation packages can either align the incentives of managers with those of shareholders or create motivations for executives to manipulate the financial statements and therefore reduce shareholder value. In the third essay, we examined whether the executive equity incentives are related to the propensity to misstate financial statements. In contrast to our hypothesis, we found

that the incidence of restatements is unrelated to the sensitivity of total, vested and unvested options for top executives, CEOs and CFOs even if we controlled for the different prompters of restatements, or to the incentives from equity, restricted stocks and long-term incentive payouts to top executives, CEOs (except for equity holdings) and CFOs. Although we found that option sensitivities for top executives, CEOs and CFOs have no effect on the magnitude of restatements, the size of the restatements were higher when CFOs have higher equity holdings. Our results also did not support the notion that firms raising more long-term debt and equity capital are more likely to misstate in order to reduce the cost of external financing. While top executives, CEOs and CFOs at restating firms did not exercise more options during the first year restated and have more holdings of in-the-money stock options than control firms, top executives and CEOs did exercise more options during the first year restated when the magnitudes of the restatements were higher.

One possible explanation for not significantly higher stock options incentives for misreporting is that large holdings of equity and restricted stock might offset the effect of stock options. This is because executives bear the consequences of misstating the financial results unless they can sell before the stock price decreases once the restated information is disclosed. It would be interesting to examine whether executives at restating firms sell their stocks to take advantage of short-run gains before the misreporting is revealed. The results also have implications for the design of the compensation contracts of executives. To reduce the incentives from stock options to misreport, one might use more equity and restricted stocks instead of stock options.

According to Becker's (1968) economic theory of crime, people commit crime because the expected utility of the payoffs exceeds the expected disutility of getting caught and punished. Assuming that stock-based compensation is designed to align the interests of managers with those of shareholders in order to maximize a firm's long-term value, two questions are: First, why are managers willing to take the risk of being caught and punished and still have the incentive to

misreport? Second, why would the payoffs from misreporting in the short run outweigh the payoffs from maximizing the firm value in the long-term. Since we found that restating firms have significantly higher growth rates than control firms, one possible answer to these questions is that firms with higher growth opportunities are more difficult to monitor (Demsetz and Lehn, 1985; Smith and Watts, 1992), which may lower the probability of getting caught for misconduct.

In response to the increasing corporate scandals, clawback provisions were introduced for U.S. public companies. "Clawback" means a repayment of previously awarded compensation by an executive to his or her employer under a certain trigger event. Under the clawback provision of the Sarbanes Oxley Act of 2002 (SOX section 304), if the firm is required to prepare an accounting restatement due to the material noncompliance of the issuer as a result of misconduct, the CEO and CFO are required to reimburse the firm for any bonus or other incentive-based compensation received and any profits realized from the sale of securities during the 12-month period following the first public issuance or filing with the Commission (whichever occurs first) of misstated financial statements. Under the clawback provision of the U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act section 954), in the event of an accounting restatement required due to material noncompliance, any current and former executive officer is required to reimburse the firm for incentive-based compensation (including stock options) in excess of what would have been paid under the accounting restatement during the three-year period preceding the date on which the company is required to prepare the accounting restatement. Canadian firms that are cross-listed in the U. S. are subject to the clawback provisions of both Acts. Certain Canadian financial institutions regulated by the Office of the Superintendent of Financial Institutions (OSFI) have adopted clawbacks as an OSFI-recommended best practice. However, other Canadian public firms are not required to adopt clawback policies. According to the study of Tuzyk (2011), 27 firms in the S&P/TSX 60 have clawback policies and only three out of these firms choose to adopt the clawback policies although they were not subject to either the U.S. provisions or OSFI-recommended best practices.

We leave a study of whether clawback provisions prevent or at least reduce the incidence of restatements to future research.

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Table 2. 1. Summary descriptive statistics on the sample of Canadian financial restatements

This table reports the characteristics of 210 Canadian financial restatements during the period 1997-2006. The total number of reasons exceeds the total number of restatements because some restatements involve more than one reason.

Panel A: Reason for restatement		
Reason for Restatement	**Number**	**Frequency (%)**
Cost or expense	59	25.7
Other	49	21.3
Revenue recognition	38	16.5
Securities related	34	14.8
Restructuring, assets or inventory	20	8.7
Reclassification	15	6.5
Acquisition or merger	11	4.8
Related-party transaction	2	0.9
In-process research and development	2	0.9
Total	230	100.0
Panel B: Initiating parties of the restatements		
Initiators	**Number**	**Frequency (%)**
Company	70	33.3
Auditor	15	7.1
Company and Auditor	21	10.0
Regulator	5	2.4
Other	9	4.3
Unknown	90	42.9
Total	210	100.0
Panel C: Industry distribution		
Industry and 2 digit SIC code	**Number**	**Frequency (%)**
Agriculture, forestry, and fisheries (01-09)	1	0.5
Mining (10-14)	52	24.8
Manufacturing (20-39)	65	31.0
Transportation, Communications, & Utility Services (40-49)	20	9.5
Wholesale Trade (50-51)	4	1.9
Retail Trade (52-59)	12	5.7
Finance, Insurance and Real Estate (60-67)	17	8.1
Services (70-89)	39	18.6
Total	210	100.0

Table 2. 1. Continued

Panel D: Distribution of restatements by year		
Year	**Number**	**Frequency (%)**
1997	1	0.5
1998	5	2.4
1999	11	5.2
2000	7	3.3
2001	21	10.0
2002	15	7.1
2003	18	8.6
2004	35	16.7
2005	41	19.5
2006	56	26.7
Total	210	100.0

Table 2. 2. Descriptive statistics for measures of liquidity around restatement announcements

This table reports summary statistics for various measures of liquidity around 210 restatement announcements (RAs). The relative quoted spread in % is measured as the difference between ask and bid prices divided by the bid-ask midpoint. The absolute effective spread in dollars is defined as twice the absolute value of the difference between the trade price and the prevailing quote midpoint. The relative effective spread in % is measured as the absolute effective spread divided by the spread midpoint. Amihud (2002) illiquidity is the daily ratio of the absolute stock return to its dollar volume (multiplied by 10^4). Dollar depth is equal to: (ask price*ask size) + (bid price*bid size). Dollar volume (in thousands) is the sum of trading volume (in thousands) times the trade price for each trade. The market quality index is the ratio of half quoted depth to the relative quoted spread. Pre-restatement or Pre-RA consists of 46 trading days ending ten days before the announcement. The post-restatement or Post-RA also consists of 46 trading days starting ten days after the announcement. Difference is calculated as the Post-RA value minus the Pre-RA value. St. Dev. refers to the standard deviation. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

Measure	Statistics	Pre-RA	Post-RA	Difference
Relative quoted spread	Mean	0.0359	0.0366	0.0008
	Median	0.0204	0.0209	-0.0000
	St. Dev.	0.0400	0.0411	0.0192
	t-stat			0.56
	Wilcoxon *p* value			0.28
Relative effective spread	Mean	0.0288	0.0296	0.0009
	Median	0.0169	0.0169	-0.0001
	St. Dev.	0.0336	0.0341	0.0215
	t-stat			0.57
	Wilcoxon *p* value			0.65
Amihud illiquidity	Mean	0.1599	0.2148	0.0549
	Median	0.0035	0.0039	0.0000
	St. Dev.	0.8328	0.9137	0.7281
	t-stat			1.08
	Wilcoxon *p* value			0.07*
Dollar depth (00s)	Mean	443.9855	429.9851	-14.0004
	Median	255.2020	255.6857	-13.6599
	St. Dev.	674.7128	619.9911	264.6934
	t-stat			-0.77
	Wilcoxon *p* value			0.06*
Dollar volume (000s)	Mean	3932.674	4202.991	270.317
	Median	207.204	199.957	2.695
	St. Dev.	13456.260	13557.280	5325.878
	t-stat			0.73
	Wilcoxon *p* value			0.33
Market Quality index (00s)	Mean	7353.21	7547.81	194.599
	Median	2083.00	2032.73	-33.323
	St. Dev.	25918.52	24012.62	4495.55
	t-stat			0.53
	Wilcoxon *p* value			0.92

Table 2. 3. Liquidity around restatement announcements for the subsamples

This table reports summary statistics for various measures of liquidity around restatement announcements for the subsamples differentiated by restatement reasons. The measures of liquidity are defined in Table 2. Pre-restatement announcement or Pre-RA period consists of 46 trading days ending ten days before the announcement. The post-restatement announcement or Post-RA period consists of 46 trading days starting ten days after the announcement. Difference (Diff.) is calculated as the Post-RA value minus the Pre-RA value. St. Dev. refers to the standard deviation. The other five restatement reasons are not reported since the results are not significantly different. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively. N is the sample size.

	Relative quoted spread			Relative effective spread			Amihud illiquidity			Dollar depth		
	Pre-RA	Post-RA	Diff.	Pre-RA	Post-RA	Diff.	Pre-RA	Post-RA	Diff.	Pre-RA	Post-RA	Diff.
Cost or expense (N = 59)												
Mean	0.031	0.031	0.000	0.024	0.026	0.001	0.283	0.189	-0.094	547.56	567.35	19.80
Median	0.015	0.016	-0.000	0.013	0.011	-0.000	0.001	0.001	0.000	364.02	401.70	-5.27
t-stat			0.00			0.74			-1.31			0.64
Wilcoxon p			0.87			0.83			0.12			0.73
Revenue recognition (N = 38)												
Mean	0.035	0.041	0.006	0.029	0.037	0.009	0.070	0.379	0.309	624.39	575.74	-48.66
Median	0.028	0.032	0.005	0.024	0.024	0.003	0.007	0.007	0.001	234.53	159.27	-52.14
t-stat			2.27**			1.68*			1.68*			-1.11
Wilcoxon p			0.01***			0.01***			0.03**			0.04**
Reclassification (N = 15)												
Mean	0.025	0.022	-0.003	0.020	0.018	-0.002	0.028	0.018	-0.011	824.76	812.40	-12.36
Median	0.021	0.016	-0.001	0.019	0.015	-0.000	0.003	0.003	-0.000	290.31	315.68	3.04
t-stat			-0.95			-0.76			-0.51			-0.37
Wilcoxon p			0.30			0.23			0.33			0.89
Other (N = 49)												
Mean	0.043	0.045	0.002	0.034	0.032	-0.002	0.121	0.273	0.152	419.61	374.51	-45.11
Median	0.021	0.022	-0.000	0.014	0.016	-0.001	0.003	0.003	-0.000	207.24	223.63	-4.96
t-stat			0.72			-0.81			1.31			-0.90
Wilcoxon p			0.95			0.15			0.40			0.74

Table 2. 4. **Multivariate analysis of changes in market liquidity for firms financially restating**

This table reports the parameter estimates of log-linear, pooled cross-sectional time-series regressions for relative quoted and effective spreads. The model is:

$$LnSpread_{it} \text{ or } LnMarket\_quality\_index_{it} = \beta_0 + \beta_1 Ln\,\mathrm{Price}_{it} + \beta_2 LnVolume_{it} + \beta_3 LnVolatiltiy_{it} + \beta_4 Crosslist_i + \beta_5 Sarbanes_i + \beta_6 Post-restatement_i + \beta_7\,\mathrm{Re}state_i + \varepsilon_{it}$$

where t=1 represents the pre-restatement period [-55, -10], t=2 represents the post-restatement period [10, 55], and t=3 represents the three-day event window [0,2]. $LnSpread_{it}$ is the natural logarithm of the relative quoted or effective spread for stock i during window t. $LnMarket\_quality\_index_{it}$ is the natural logarithm of market quality index for stock i during window t. $LnPrice_{it}$, $LnVolume_{it}$ and $LnVolatility_{it}$ are the natural logarithms of average daily closing prices, average daily trading volumes in number of shares and standard deviations of daily returns for stock i over the three windows, respectively. $Crosslist_i$ is a dummy variable that is equal to one if stock i is cross-listed and zero otherwise. $Sarbanes_i$ is a dummy variable that is equal to one if restatement of stock i is announced after the Sarbanes-Oxley Act on July 30, 2002 and zero otherwise. $Post\text{-}restatement_i$ is a dummy variable that is equal to one in the post-restatement period and zero otherwise. *Restate* is a dummy variable that is equal to one in the three-day event window [0, 2] and is zero otherwise. The t-stat uses White heteroscedasticity-consistent standard error estimates. ***, ** and * indicate significance at the 0.01, 0.05 and 0.10 levels, respectively.

	Ln(relative quoted spread)		Ln(relative effective spread)		Ln(Market quality index)	
Independent variables	Coefficient	*t*-stat	Coefficient	*t*-stat	Coefficient	*t*-stat
Intercept	0.4788	3.18***	0.1633	1.01	11.3221	163.82***
Ln Price	-0.3826	-17.94***	-0.3965	-20.23***	-0.0412	-3.82***
Ln Volume	-0.2474	-28.29***	-0.2268	-24.16***	0.0220	5.18***
Ln Volatility	0.4282	10.30***	0.4400	11.46***	-0.2189	-8.19***
Crosslist	-0.2127	-4.37***	-0.2944	-6.27***	0.1394	6.69***
Sarbanes	-0.2519	-4.99***	-0.2518	-5.44***	-0.0399	-1.21
Post-restatement	0.4431	5.43***	0.4444	4.18***	-0.0230	-1.42
Restate	0.3789	3.28***	0.5252	3.96***	-0.0711	-2.29***
Adjusted R^2	0.82		0.77		0.53	

Table 2. 5. The components of the bid-ask spreads

This table reports the estimates of the permanent and transitory components of the bid-ask spread using both the Glosten and Harris model and Madhavan, Richardson and Roomans model. Pre-restatement announcement or Pre-RA period consists of 46 trading days ending ten days before the announcement. The post-restatement announcement or Post-RA period consists of 46 trading days starting ten days after the announcement. Difference is calculated as the Post-RA value minus the Pre-RA value. Mean (Median) ($) is mean (median) dollar spread component. Mean (Median) (%) is proportional mean (median) spread component. Both models discard observations with negative spread component estimates. N is the sample size. *t*-test and Wilcoxon signed rank tests are used to test the average differences in each spread component between the pre-and post-restatement announcement periods. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Permanent Component			Transitory Component		
	Pre-RA	Post-RA	Difference	Pre-RA	Post-RA	Difference
Panel A: Madhavan, Richardson, and Roomans (1997) model (*N=168*)						
Mean ($)	0.0132	0.0212	0.0080	0.0134	0.0071	-0.0063
Median ($)	0.0062	0.0084	0.0012	0.0048	0.0043	-0.0005
t-stat			3.26***			-2.51**
Wilcoxon *p* value			0.00***			0.00***
Mean (%)	0.6220	0.8078	0.1858	0.3780	0.1922	-0.1858
Median(%)	0.4781	0.5566	0.0824	0.5219	0.4434	-0.0824
t-stat			3.02***			-3.02***
Wilcoxon *p* value			0.00***			0.00***
Panel B: Glosten and Harris (1988) model (*N=196*)						
Mean ($)	0.0157	0.0163	0.0006	0.0423	0.0341	-0.0083
Median ($)	0.0082	0.0071	-0.0005	0.0242	0.0194	-0.0011
t-stat			0.21			-2.41**
Wilcoxon *p* value			0.00***			0.00***
Mean (%)	0.2774	0.3195	0.0421	0.7226	0.6805	-0.0421
Median(%)	0.2389	0.2450	0.0018	0.7611	0.7550	-0.0018
t-stat			0.80			-0.80
Wilcoxon *p* value			0.69			0.69
Panel C: Madhavan, Richardson, and Roomans (1997) model (Revenue recognition subsample)						
Mean ($)	0.0131	0.0241	0.0110	0.0123	0.0048	-0.0083
Median ($)	0.0111	0.0110	0.0013	0.0048	0.0036	-0.0008
t-stat			2.14**			-2.01**
Wilcoxon *p* value			0.20			0.06*
Panel D: Madhavan, Richardson, and Roomans (1997) model (Cost or expense subsample)						
Mean ($)	0.0111	0.0246	0.0135	0.0205	0.0104	-0.0101
Median ($)	0.0056	0.0088	0.0016	0.0076	0.0047	-0.0013
t-stat			2.30**			-2.47**
Wilcoxon *p* value			0.00***			0.01***

Table 2. 6. Results for the Easley, Kiefer, O'Hara and Paperman or EKOP (1996) Model

This table reports the EKOP parameter estimates for restatements announcements. Pre-restatement period consists of 46 trading days ending ten days before the restatement announcement. The post-restatement period consists of 46 trading days starting ten days after the restatement announcement. St. Dev. refers to the standard deviation. α is the probability of an information event, δ is the probability of bad news, μ is the arrival rate of informed traders, and ε is the arrival rate of uninformed traders. PIN is a function of the parameters that represents the probability of informed trade (equation (5) in the body of the paper). For α, δ and PIN, change is calculated as the post-restatement value minus the pre-restatement value. For μ and ε, change is calculated as post-restatement over the pre-restatement minus one. *t*- and Wilcoxon signed rank tests are conducted for differences in average values between the pre- and post-restatement announcement periods. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	α	δ	μ	ε	PIN
Panel A: Pre-restatement (Full sample)					
Mean	0.3361	0.4987	118.2233	100.3512	0.2620
Median	0.3306	0.5000	34.3573	13.1765	0.2395
St. Dev.	0.1837	0.2699	217.4437	256.1669	0.1140
Panel B: Post-restatement (Full sample)					
Mean	0.3374	0.5302	125.3739	115.8272	0.2727
Median	0.3261	0.5143	39.1803	15.5263	0.2479
St. Dev.	0.1877	0.2689	218.5353	297.1689	0.1325
Panel C: Change from Pre- to Post-restatement Period (Full sample)					
Mean	0.0013	0.0315	0.5516	0.2620	0.0108
Median	-0.0206	0.0322	0.1292	0.0548	-0.0004
St. Dev.	0.2373	0.3214	1.6031	0.9002	0.1400
t-stat	0.08	1.39	4.88***	4.13***	1.09
Wilcoxon *p* value	0.53	0.10*	0.00***	0.01***	0.68
Panel D: Change from Pre- to Post-restatement Period (Cost or expense subsample)					
Mean	0.0409	0.0992	0.4747	0.0683	0.0557
Median	-0.0130	0.0898	0.1248	-0.0369	0.0234
St. Dev.	0.2976	0.2882	1.5184	0.5505	0.1834
t-stat	1.05	2.62**	2.38**	0.95	2.31**
Wilcoxon *p* value	0.71	0.02**	0.04**	0.79	0.03**

Table 2. 7. Summary statistics on the number of buyer- and seller-initiated trades

This table reports the median and different percentiles of the mean on the daily number of buy and sell orders during the pre- and post-restatement announcement periods. The buyer- and seller-initiated trades are identified based on the algorithm of Lee and Ready (1991). Pre-restatement period consists of 46 trading days ending ten days before each restatement announcement. The post-restatement period consists of 46 trading days starting ten days after each restatement announcement.

	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile
Panel A: Pre-restatement period					
Mean buys	1.2	4	16	74	849
Mean sells	1.5	5	17	61	689
Variance buys	2.09	15.03	190.90	2742.51	118238.12
Variance sells	1.94	18.29	167.21	1859.06	89680.11
Correlation between buys and sells	-0.21	0.17	0.42	0.66	0.87
Panel B: Post-restatement period					
Mean buys	1.0	4	20	77	621
Mean sells	1.7	5	20	69	679
Variance buys	1.92	18.10	335.44	2767.01	105055.15
Variance sells	3.36	27.88	218.53	2402.35	33081.82
Correlation between buys and sells	-0.11	0.23	0.48	0.68	0.88

Table 2. 8. Financial analyst behavior around restatement announcements

This table reports the analysts' forecast revisions, analyst following and analysts' forecast dispersion around restatement announcements. The pre-RA (post-RA) earnings forecast is the earnings forecast of analysts made in the month before (after) the restatement announcement, scaled by the price 30 days before the announcement. The mean (median) analysts' earnings forecast revisions or analysts' earnings forecast difference for the current and next fiscal year is calculated as follows:

$$FR_{i,(t-1,t+1)} = \left(AF_{i,t+1}/P_{i,t-1}\right) - \left(AF_{i,t-1}/P_{i,t-1}\right)$$

where the variables are defined in the body of the paper. Analyst following is the number of analysts following the stock. Analysts' forecast dispersion is the standard deviation of the earnings forecasts. Results for median analysts' earnings forecast revisions are shown in parentheses. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively. N refers to the sample size.

	Pre-RA	Post-RA	Difference
Panel A: Current fiscal year analysts' earnings forecasts (*N*=88)			
Mean	-0.0306 (-0.0327)	-0.0854 (-0.0735)	-0.0548 (-0.0408)
Median	0.0416 (0.0411)	0.0364 (0.0340)	-0.0011 (-0.0007)
t-stat			-1.74* (-2.29**)
Wilcoxon *p* value			0.00*** (0.00***)
Panel B: Next fiscal year analysts' earnings forecasts (*N*=87)			
Mean	0.0638 (0.0620)	0.0339 (0.0366)	-0.0299 (-0.0254)
Median	0.0631 (0.0603)	0.0557 (0.0551)	-0.0048 (-0.0046)
t-stat			-2.17** (-1.93*)
Wilcoxon *p* value			0.00*** (0.00***)
Panel C: Analyst following (*N*=88)			
Mean	5.50	5.35	-0.15
Median	3.00	3.00	0.00
t-stat			-1.04
Wilcoxon *p* value			0.35
Panel D: Analysts' forecast dispersion (*N*=62)			
Mean	0.1655	0.1971	0.0316
Median	0.0600	0.0400	0.0000
t-stat			0.96
Wilcoxon *p* value			0.75

Table 2. 9. The Average Abnormal Returns (AARs) and Cumulative Average Abnormal Returns (CAARs)

The abnormal returns (ARs) over the event window [-5, 5] for the financial restatements are obtained from:

$$R_{it} = \alpha_i + \beta_1 R_{mt} + \beta_2 R_{mt} D_1 + \sum_{j=-5}^{5} \gamma_{ij} D_{2j} + \varepsilon_{it}$$

where the variables are defined in the body of the text. The daily ARs are averaged cross-sectionally to obtain the daily average ARs (or AARs). The cumulative AARs (or CAARs) are the sum of the AARs for three multi-day windows. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively. St. Dev., Q1 and Q3 refer to standard deviation, first quartile and second quartile, respectively. N is the sample size.

Day	Mean	St. Dev.	Q1	Median	Q3
Panel A: Full sample (N = 210)					
-5	-0.0038	0.0555	-0.0212	-0.0021	0.0180
-4	0.0037	0.0545	-0.0156	-0.0012	0.0173
-3	0.0047	0.0743	-0.0193	0.0005	0.0159
-2	0.0009	0.0509	-0.0146	-0.0003	0.0167
-1	-0.0036	0.0497	-0.0235	-0.0027*	0.0131
0	-0.0261***	0.0951	-0.0310	-0.0079***	0.0084
1	-0.0173***	0.0972	-0.0365	-0.0091***	0.0165
2	-0.0090***	0.0509	-0.0305	-0.0036***	0.0122
3	-0.0054	0.0559	-0.0238	-0.0014	0.0142
4	-0.0041	0.0592	-0.0252	-0.0033	0.0149
5	-0.0011	0.0525	-0.0177	-0.0029	0.0142
(-1,1)	-0.0470***	0.1516	-0.0749	-0.0166***	0.0163
(-5,-1)	0.0019	0.0997	-0.0448	-0.0054	0.0446
(0,2)	-0.0524***	0.1519	-0.0805	-0.0196***	0.0137
Panel B: Subsample by trade venue					
Listed only on the TSX (N = 138)					
(0,2)	-0.0449***	0.1606	-0.0805	-0.0142***	0.0204
Cross-listed (including NYSE, NASDAQ, AMEX, OTC, and other) (N = 72)					
(0,2)	-0.0667***	0.1335	-0.0831	-0.0355***	-0.0002
Panel C: Subsample by earnings releases					
Restatement announcements without earnings releases (N = 113)					
(0,2)	-0.0402***	0.1437	-0.0668	-0.0168***	0.0122
Restatement announcements with earnings releases (N = 97)					
(0,2)	-0.0666***	0.1605	-0.0952	-0.0239***	0.0201

Table 2. 9. Continued

Panel D: Subsample by reasons for restatement					
Cost or expense (N = 59)					
(0,2)	-0.0424***	0.1204	-0.0683	-0.0144***	0.0137
Revenue recognition (N = 38)					
(0,2)	-0.1423***	0.2459	-0.2504	-0.0635***	-0.0110
Securities related (N = 34)					
(0,2)	-0.0406**	0.0999	-0.0860	-0.0150**	0.0162
Reclassification (N = 15)					
(0,2)	-0.0247**	0.0386	-0.0458	-0.0283**	-0.0038
Restructuring, assets or inventory (N = 20)					
(0,2)	-0.0308	0.1078	-0.0810	-0.0245	-0.0050
Acquisition or merger (N = 11)					
(0,2)	-0.0119	0.1949	-0.0224	-0.0051	0.0690
Other (N= 49)					
(0,2)	-0.0381**	0.1190	-0.0805	-0.0175**	0.0265

Table 2. 10. Cross-sectional regression results for abnormal returns

This table reports the cross-sectional regression results for the determinants of abnormal returns. The dependent variable is the three-day cumulative abnormal return from announcement date to two days after the restatement announcements. *REVENUE* is equal to one if the restatement is related to revenue recognition, and zero otherwise. *COMP*, *AUDITOR* and *REGULATOR* are equal to one if the restatement is initiated by the company, auditor and regulator, respectively, and zero otherwise. SIZE is the natural log of market capitalization which is equal to the total number of shares outstanding multiplied by the closing price 10 days before the restatement announcements. *EFFSPRDIFF* is the difference in effective spreads measured by the Madhavan, Richardson and Roomans or MRR model following restatements. *FR* is the median revision in the earnings forecasts of analysts. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Model 1		Model 2	
Independent variable	Coefficient	*t*-stat	Coefficient	*t*-stat
Intercept	-0.0911	-0.76	-0.2094	-1.12
REVENUE	-0.1421	-4.42***	-0.1244	-2.93***
COMP	-0.0454	-1.74*	-0.0627	-1.78*
AUDITOR	0.0125	0.27	0.0369	0.55
REGULATOR	0.0148	0.16	0.0167	0.16
SIZE	0.0037	0.60	0.0094	1.02
EFFSPRDIFF	-0.0064	-1.02	-0.0023	-0.34
FR			0.2898	3.04***
Number of observations	168		88	
Adjusted R^2	0.1125		0.2394	
F-statistic	4.53***		4.69***	

Table 2. 11. Component GARCH results around financial restatement announcements

This table reports the results for the component GARCH or CGARCH without and with asymmetry for 205 and 210 financial restatement announcements (events), respectively. Convergence was not achieved for five announcements using CGARCH without asymmetry. For each event, the mean equation is given by:

$$R_{it} = \alpha_i + \beta_1 R_{mt} + \beta_2 R_{mt} D_1 + \sum_{j=-5}^{5} \gamma_{ij} D_{2j} + \varepsilon_{it} \quad (1)$$

The component GARCH with asymmetry is:

$$h_{it} - q_{it} = \delta_i (\varepsilon_{it-1}^2 - q_{it-1}) + \theta_i (\varepsilon_{it-1}^2 - q_{it-1}) d_{t-1} + \mu_i (h_{it-1} - q_{it-1}) + \tau_{i1} D_1 \quad (2)$$

$$q_{it} = \omega_i + \rho_i (q_{it-1} - \omega) + \varphi_i (\varepsilon_{it-1}^2 - h_{it-1}) + \tau_{i2} D_1 \quad (3)$$

The second-term on the right-hand-side of equation (2) is absent in the CGARCH without asymmetry. Cross-sectional average parameter estimates (Coef.) are reported along with their corresponding *t*-statistics (t-stat.). ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

Parameters	CGARCH without asymmetry		CGARCH with asymmetry	
	Coef.	*t*-stat	Coef.	*t*-stat
α	0.0003	1.63*	0.0006	1.76*
β_1	0.5168	10.57***	0.5137	11.10***
β_2	0.0637	0.86	0.1328	1.31
γ_{-5} (Day= -5)	-0.0027	-0.71	0.0044	0.62
γ_{-4} (Day= -4)	0.0032	0.93	0.0157	2.55***
γ_{-3} (Day= -3)	0.0056	1.10	-0.0004	-0.07
γ_{-2} (Day= -2)	0.0015	0.40	0.0062	0.98
γ_{-1} (Day= -1)	-0.0018	-0.49	-0.0018	-0.39
γ_0 (Day= 0)	-0.0272	-4.08***	-0.0254	-3.39***
γ_1 (Day= 1)	-0.0172	-2.57***	-0.0122	-1.06
γ_2 (Day= 2)	-0.0074	-1.98**	-0.0162	-2.44**
γ_3 (Day= 3)	-0.0047	-1.21	0.0049	0.73
γ_4 (Day= 4)	-0.0040	-0.96	-0.0101	-1.24
γ_5 (Day= 5)	0.0008	0.20	0.0009	0.16
δ	0.0634	10.84***	0.0038	0.27
μ	0.0550	4.04***	0.0743	2.57***
τ_1	-0.0022	-1.10	0.0027	1.16
ω	0.0069	1.49	0.0072	1.58
ρ	0.6485	61.67***	0.6254	47.63***
φ	0.0765	17.76***	0.0503	3.72***
τ_2	-0.0010	-0.92	0.0185	12.12***
θ			0.0789	11.55***
$\tau_1 + \tau_2$	-0.0033	-1.04	0.0212	11.63***

Table 2. 12. Stock return synchronicity around restatement announcements

This table reports the changes in the stock price synchronicity measured by R^2 from the following regression around the restatement announcements (RAs):

$$R_{i,t} = \alpha_i + \beta_{1i} R_{m,t} + \beta_{2i}[R_{US,t} + EX_t] + \varepsilon_i$$

where the variables are defined in the body of the paper. The pre- and post-restatement regression is run over a 12 month period ending one month before restatement and starting one month after restatement announcements for daily and weekly returns, respectively. Zero-return metric is measured as the number of zero-return days over 12 month periods ending one month before the restatement and starting one month after restatement announcements. Difference is calculated as the Post-RA value minus the Pre-RA value. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Pre-RA	Post-RA	Difference
Panel A: R^2 using daily returns (Full sample)			
Mean	0.0503	0.0600	0.0097
Median	0.0196	0.0228	0.0016
t-stat			2.14**
Wilcoxon *p* value			0.12
Panel B: R^2 using weekly returns (Full sample)			
Mean	0.0983	0.1229	0.0245
Median	0.0687	0.0734	0.0069
t-stat			2.53***
Wilcoxon *p* value			0.07*
Panel C: R^2 using daily returns (Securities related subsample)			
Mean	0.0527	0.0792	0.0265
Median	0.0263	0.0349	0.0090
t-stat			2.08**
Wilcoxon *p* value			0.08*
Panel D: R^2 using weekly returns (Securities related subsample)			
Mean	0.1054	0.1695	0.0641
Median	0.0760	0.1180	0.0399
t-stat			2.11**
Wilcoxon *p* value			0.04**
Panel E: Zero return metric (Full sample)			
Mean	0.1363	0.1409	0.0047
Median	0.1222	0.1116	-0.0031
t-stat			0.88
Wilcoxon *p* value			0.76
Panel F: Zero return metric (Revenue recognition subsample)			
Mean	0.1328	0.1657	0.0329
Median	0.1225	0.1494	0.0226
t-stat			2.03**
Wilcoxon *p* value			0.06*

Table 3. 1. Descriptive statistics for restating firms

This table reports the characteristics of 177 Canadian financial restatements during the period 1997-2006. The total number of reasons exceeds the total number of restatements because some restatements involve more than one reason.

Panel A: Reason for restatement		
Reason for Restatement	**Number**	**Frequency (%)**
Cost or expense	48	25.53
Other	44	23.40
Revenue recognition	34	18.09
Securities related	28	14.89
Reclassification	12	6.38
Restructuring, assets or inventory	12	6.38
Acquisition or merger	6	3.19
Related-party transaction	2	1.06
In-process research and development	2	1.06
Total	188	100.0
Panel B: Initiating parties of the restatements		
Initiators	**Number**	**Frequency (%)**
Company	59	33.33
Auditor	15	8.47
Company and Auditor	17	9.60
Regulator	4	2.26
Other	6	3.39
Unknown	76	42.94
Total	177	100.0
Panel C: Industry distribution		
Industry and 2 digit SIC code	**Number**	**Frequency (%)**
Agriculture, forestry, and fisheries (01-09)	0	0.00
Mining (10-14)	45	25.42
Construction (15-17)	2	1.13
Manufacturing (20-39)	54	30.51
Transportation, Communications, & Utility Services (40-49)	14	7.91
Wholesale Trade (50-51)	4	2.26
Retail Trade (52-59)	10	5.65
Finance, Insurance and Real Estate (60-67)	15	8.47
Services (70-89)	33	18.64
Total	177	100.0

Table 3. 2. Summary statistics for sample and control firms

This table reports summary statistics for both financial and governance variables for restating and control firms. The variables are defined in the body of the paper. Sales and total assets are in millions of dollars. Sales growth and Return on Assets (ROA) is in percent. *p*-value is for a two-tailed *t*-test for the difference in means and Wilcoxon signed rank test for differences in medians, respectively. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Mean			Median			Sample
Variable	Sample	Control	*p*-value	Sample	Control	*p*-value	Size
Sales	1253.81	1494.90	0.56	73.47	59.88	0.02**	177
Total assets	2174.49	5843.23	0.42	121.60	100.49	0.00***	177
Total liability/total assets	0.480	0.411	0.01***	0.476	0.385	0.01***	177
Sales growth	41.569	20.355	0.16	14.403	10.043	0.51	110
ROA	-9.555	-5.100	0.05**	-1.533	0.972	0.12	177
Board size	7.785	7.808	0.93	7.00	7.00	0.84	177
Proportion of unrelated directors	0.658	0.677	0.28	0.667	0.667	0.39	177
Number of board meeting	8.536	8.478	0.95	8.00	7.00	0.97	69
Audit committee size	3.282	3.322	0.65	3.00	3.00	0.76	177
Proportion of unrelated audit committee	0.898	0.922	0.22	1.00	1.00	0.04**	177
Number of audit committee meetings	5.430	4.570	0.06*	4.00	4.00	0.05*	93
At least one of audit committee is financial expert=1 if yes, and 0 otherwise	0.751	0.831	0.07*	1.00	1.00	0.07*	177
CEO is the chair of the board	0.339	0.395	0.29	0.00	0.00	0.29	177
CEO tenure on board	8.472	9.453	0.30	6	7	0.19	161
CEO belongs to the founding family=1 if yes, and 0 otherwise	0.373	0.333	0.40	0.00	0.00	0.40	177
# of blockholders	0.582	0.757	0.05**	0.00	1.00	0.04**	177
Blockholder ownership	0.112	0.142	0.14	0.00	0.10	0.14	177
CEO ownership	0.087	0.114	0.12	0.014	0.022	0.07*	161
Management ownership	0.093	0.110	0.45	0.014	0.018	0.26	113
Related directors ownership	0.129	0.135	0.83	0.027	0.022	0.70	92
Unrelated directors ownership	0.036	0.059	0.22	0.003	0.006	0.23	140
Top3 ownership	0.096	0.139	0.11	0.025	0.033	0.14	92
Big 5 firm=1 if auditor is big 5 firm, and 0 otherwise	0.825	0.910	0.02**	1.00	1.00	0.01***	177
Non-audit fees/total fees	0.295	0.337	0.13	0.282	0.331	0.13	96

Table 3. 3. Correlation matrix

This table reports the correlations between the regression variables. The variables are defined in the body of the paper. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

Variable	RESTATE	PUNRELDIR	PUNRELAUD	EXPERT	CEOCHAIR	CEOFOUND	BLOCKHLD	CEOOWN	LEVERAGE	BIG5
PUNRELDIR	-0.06									
PUNRELAUD	-0.06	0.54**								
EXPERT	-0.10*	0.06	0.21***							
CEOCHAIR	-0.06	-0.14**	-0.04	-0.07						
CEOFOUND	0.04	-0.17***	0.05	-0.11**	0.30***					
BLOCKHLD	-0.08	0.26***	0.06	-0.01	-0.13***	-0.15***				
CEOOWN	-0.06	-0.09	-0.05	0.01	0.11**	0.00	-0.05			
LEVERAGE	0.12**	0.04	-0.03	0.09	0.06	-0.04	0.07	-0.07		
BIG5	-0.12**	0.17***	0.13**	0.09	0.00	-0.01	0.04	-0.14***	0.04	
GROWTH	0.11*	-0.12**	-0.13**	0.02	-0.03	0.04	0.01	-0.04	-0.02	0.03

Table 3. 4. Logistic regression of the likelihood of restatement

This table reports the results of the following logistic regression:

RESTATE=*f* (PUNRELDIR or PUNRELAUD, EXPERT, CEOCHAIR, CEOFOUND, BLOCKHLD, MGMTOWN, BIG5, LEVERAGE, GROWTH)

where RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero if the firm is a control firm. PUNRELDIR is the proportion of directors who are unrelated. PUNRELAUD is the proportion of directors in the audit committee who are unrelated. EXPERT is a dummy variable that is equal to one if the audit committee includes at least one director who is a CPA, CFA, CA, investment banker or venture capitalist, or has served as chief financial officer, vice president of finance, controller or treasurer. CEOCHAIR is a dummy variable that is equal to one if the CEO is also the board chair and zero otherwise. CEOFOUND is a dummy variable that is equal to one if the CEO belongs to the founding family of the firm and zero otherwise. BLOCKHLD is defined as the percentage of voting rights held by outside blockholders with at least ten percent of the voting rights attached to any class of voting securities who are unaffiliated with management. MGMTOWN is the percentage of voting rights held by management who serves on the board. BIG5 is a dummy variable that is equal to one if the firm's external auditor is a Big 5 auditing firm and zero otherwise. LEVERAGE is calculated as the ratio of total liabilities divided by total assets. Growth is calculated as the compound growth rate of sales in the three years preceding the year of restatement announcement. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Model 1		Model 2	
Independent variable	Coefficient	*p*-value	Coefficient	*p*-value
Intercept	2.280**	0.03	1.250	0.23
PUNRELDIR	-0.719	0.52		
PUNRELAUD			0.689	0.50
EXPERT	-0.916**	0.03	-0.992**	0.02
CEOCHAIR	0.058	0.87	0.092	0.79
CEOFOUND	0.133	0.70	0.121	0.73
BLOCKHLD	-2.294***	0.01	-2.452***	0.01
MGMTOWN	-2.389**	0.02	-2.229**	0.02
BIG5	-1.267***	0.01	-1.314***	0.01
LEVERAGE	1.179**	0.05	1.143*	0.06
GROWTH	0.003*	0.09	0.003*	0.08
Pseudo R^2	0.10		0.10	
Observations	215		215	

Table 3. 5. Turnover for sample and control firms

This table reports the mean turnover rates of the CEO, President, Board Chair, top three executives, CFO, unrelated directors, audit committee members and external auditor for sample and control firms during years +1, +2 and (1, 2) following the restatement announcements. *t*-test and Wilcoxon test *p*-values are for differences in means and medians, respectively. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

Year	Restate	Control	*t*-test *p*-value	Wilcoxon test *p*-value	Sample size
Panel A: Chief Executive Officer (CEO) turnover					
+1	0.252	0.086	0.00***	0.00***	163
+2	0.128	0.099	0.43	0.44	141
(1,2)	0.337	0.160	0.00***	0.00***	163
Panel B: President turnover					
+1	0.293	0.088	0.00***	0.00***	147
+2	0.150	0.173	0.61	0.62	127
(1,2)	0.387	0.220	0.01***	0.01***	148
Panel C: Board Chair turnover					
+1	0.131	0.069	0.07	0.07	145
+2	0.115	0.077	0.30	0.31	130
(1,2)	0.216	0.142	0.10*	0.10*	148
Panel D: Top three executives (CEO, President, Board Chair) turnover					
+1	0.339	0.161	0.00***	0.00***	168
+2	0.214	0.214	1.00	1.00	145
(1,2)	0.435	0.333	0.06*	0.06*	168
Panel D: Chief Financial Officer (CFO) turnover					
+1	0.309	0.125	0.00***	0.00***	152
+2	0.212	0.159	0.28	0.28	132
(1,2)	0.431	0.248	0.00***	0.00***	152
Panel E: Unrelated directors turnover					
+1	0.494	0.482	0.84	0.84	168
+2	0.421	0.386	0.54	0.54	145
(1,2)	0.649	0.613	0.47	0.47	168
Panel E: Audit committee turnover					
+1	0.476	0.476	1.00	1.00	168
+2	0.400	0.331	0.24	0.24	145
(1,2)	0.637	0.643	0.91	0.91	168
Panel F: External Auditor turnover					
+1	0.179	0.036	0.00***	0.00***	168
+2	0.097	0.048	0.00***	0.00***	145
(1,2)	0.262	0.077	0.00***	0.00***	168

Table 3. 6. Logistic regression for management and auditor turnover

This table reports the results for the following logistic regression:

TURNOVER=*f* (RESTATE, PUNRELDIR, BODSIZE, CEOCHAIR, ROA, CAR)

where RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero if the firm is a control firm. PUNRELDIR is the proportion of directors who are unrelated. BODSIZE is the number of directors on the board. CEOCHAIR is a dummy variable that is equal to one if CEO is also the board chair and zero otherwise. ROA is return on assets in the year prior to restatement announcements. CAR is the cumulative abnormal return over days (-5, 5) around restatement announcements. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

Independent variable	CEO Turnover	President Turnover	Top 3 Turnover	CFO Turnover	Auditor Turnover
Panel A: Year +1					
Intercept	-2.512***	-2.585***	-2.296***	-1.394**	-2.168**
	(0.00)	(0.00)	(0.00)	(0.05)	(0.02)
RESTATE	0.993***	1.168***	0.851***	1.025***	1.693***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
PUNRELDIR	-0.0497	-0.132	0.045	-0.628	-0.471
	(0.60)	(0.89)	(0.96)	(0.46)	(0.66)
BODSIZE	0.044	0.031	0.054	-0.025	-0.120
	(0.48)	(0.63)	(0.29)	(0.67)	(0.15)
CEOCHAIR	-0.172	-0.133	0.208	-0.462	0.102
	(0.62)	(0.70)	(0.45)	(0.88)	(0.79)
ROA	-0.017***	-0.014**	-0.014***	-0.010*	-0.008
	(0.00)	(0.02)	(0.01)	(0.09)	(0.22)
CAR	-2.408***	-2.223***	-1.416**	-1.292*	-0.254
	(0.00)	(0.00)	(0.05)	(0.08)	(0.78)
Pseudo R^2	0.121	0.118	0.070	0.076	0.110
Observations	331	314	336	320	336
Panel B: Year (1,2)					
Intercept	-1.552**	-1.188*	-0.910	-1.286**	-1.467*
	(0.02)	(0.07)	(0.12)	(0.04)	(0.06)
RESTATE	0.744***	0.479*	0.280	0.766***	1.338***
	(0.01)	(0.07)	(0.24)	(0.00)	(0.00)
PUNRELDIR	-0.155	0.136	0.025	0.389	-0.007
	(0.85)	(0.87)	(0.97)	(0.61)	(0.99)
BODSIZE	0.006	-0.011	0.026	-0.022	-0.149**
	(0.92)	(0.84)	(0.57)	(0.66)	(0.04)
CEOCHAIR	-0.667**	-0.558*	-0.268	0.030	-0.027
	(0.03)	(0.06)	(0.28)	(0.91)	(0.93)
ROA	-0.018***	-0.017***	-0.017***	-0.009*	-0.016***
	(0.00)	(0.00)	(0.00)	(0.09)	(0.01)
CAR	-2.068***	-1.636**	-1.186*	-1.026	-0.568
	(0.01)	(0.02)	(0.08)	(0.13)	(0.47)
Pseudo R^2	0.104	0.073	0.043	0.047	0.123
Observations	331	316	336	321	336

Table 3. 7. Descriptive statistics for restating firms and control firms by SOX period

This table reports descriptive statistics for restating firms in the period before and after the Sarbanes-Oxley Act (SOX). The Pre-Sox period is 1997 to July 30, 2002 and the post-SOX period is July 30, 2002 to 2006. Size of the restatement is the cumulative impact of the restatement on net income scaled by total assets in the year prior to the restatement announcement. CAR is the cumulative abnormal return over days [-5, 5] around restatement announcements. The *p*-value for difference-in-means *t*-stats in Panel A is calculated assuming unequal variances ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

Panel A: descriptive statistics for restating firms by SOX period					
	Pre-SOX Mean (n=48)	Post-SOX Mean (n=129)	Difference	*p*-value	
Size of Restatement	-0.066	-0.013	-0.048	0.14	
CAR	-0.120	-0.052	-0.069*	0.10	
Panel B: turnover rates by SOX period					
	Restate	Control	*t*-test *p*-value	Wilcoxon test *p*-value	Sample size
CEO turnover					
Pre-SOX	0.429	0.143	0.00***	0.01***	42
Post-SOX	0.306	0.165	0.01***	0.01***	121
President turnover					
Pre-SOX	0.564	0.308	0.04**	0.04**	39
Post-SOX	0.312	0.211	0.09*	0.09*	109
Board Chair turnover					
Pre-SOX	0.275	0.050	0.01***	0.01***	40
Post-SOX	0.194	0.176	0.73	0.74	108
Top three executives (CEO, President, Board Chair) turnover					
Pre-SOX	0.605	0.302	0.01***	0.01***	43
Post-SOX	0.376	0.344	0.58	0.59	125
CFO turnover					
Pre-SOX	0.567	0.243	0.01***	0.01***	37
Post-SOX	0.387	0.250	0.02**	0.02**	116
Unrelated directors turnover					
Pre-SOX	0.837	0.605	0.02**	0.04**	43
Post-SOX	0.584	0.616	0.57	0.57	125
External Auditor turnover					
Pre-SOX	0.302	0.023	0.00***	0.00***	43
Post-SOX	0.248	0.096	0.00***	0.00***	125
Audit Committee turnover					
Pre-SOX	0.651	0.674	0.82	1.00	43
Post-SOX	0.632	0.624	0.89	0.89	125

Table 3. 8. Logistic regressions for management turnover considering the effects of SOX

This table reports the results for the following logistic regression:

$$TURNOVER = \beta_0 + \beta_1 RESTATE + \beta_2 POSTSOX + \beta_3 RESTATE * POSTSOX + \beta_4 PUNRELDIR + \beta_5 BODSIZE + \beta_6 CEOCHAIR + \beta_7 ROA + \varepsilon$$

where TURNOVER is a dummy variable that is equal to one if the person who holds the position (CEO, President, CFO) leaves the firm within twenty-four months following the restatement announcements. RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero otherwise. POSTSOX is a dummy variable that is equal to one if the restatement is announced in the post-SOX period, and zero otherwise. PUNRELDIR is the proportion of directors who are unrelated. BODSIZE is the number of directors on the board. CEOCHAIR is a dummy variable that is equal to one if the CEO is also the board chair and zero otherwise. ROA is return on assets in the year prior to restatement announcements. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

Independent variable	CEO Turnover	President Turnover	Top 3 Turnover	CFO Turnover
Intercept	-1.495* (0.06)	-0.604 (0.39)	-0.917 (0.16)	-1.225* (0.08)
RESTATE	1.258** (0.02)	0.767* (0.10)	1.089** (0.02)	1.384*** (0.01)
POSTSOX	0.128 (0.81)	-0.610 (0.16)	0.176 (0.66)	0.099 (0.82)
RESTATE*POSTSOX	-0.520 (0.42)	-0.241 (0.67)	-0.985* (0.07)	-0.741 (0.20)
PUNRELDIR	-0.209 (0.80)	0.245 (0.76)	-0.033 (0.96)	0.348 (0.65)
BODSIZE	-0.003 (0.95)	-0.032 (0.54)	0.018 (0.70)	-0.033 (0.51)
CEOCHAIR	-0.707** (0.02)	-0.645** (0.03)	-0.305 (0.22)	0.002 (0.99)
ROA	-0.018*** (0.00)	-0.017*** (0.00)	-0.016*** (0.00)	-0.009 (0.11)
Pseudo R^2	0.085	0.076	0.047	0.048
Observations	331	316	336	321

Table 3. 9. Logistic regression for management turnover considering the effects of SOX and severity of restatements

This table reports the results for the following logistic regression:

$$TURNOVER = \beta_0 + \beta_1 POSTSOX + \beta_2 RESTATESIZE \text{ or } CAR + \beta_3 RESTATESIZE * POSTSOX \text{ or } CAR * POSTSOX + \beta_4 PUNRELDIR + \beta_5 BODSIZE + \beta_6 CEOCHAIR + \beta_7 ROA + \varepsilon$$

Where RESTATESIZE is the cumulative impact of the restatement on net income scaled by total assets in the year prior to the restatement announcement. CAR is the cumulative abnormal return over days [-5, 5] around restatement announcements. POSTSOX is a dummy variable that is equal to one if the restatement is announced in the post-SOX period, and zero otherwise. PUNRELDIR is the proportion of directors who are unrelated. BODSIZE is the number of directors on the board. CEOCHAIR is a dummy variable that is equal to one if the CEO is also the board chair and zero otherwise. ROA is return on assets in the year prior to restatement announcements. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	CEO Turnover		President Turnover		Top 3 Turnover		CFO Turnover	
Intercept	-0.649	-0.943	-0.146	-0.311	-0.389	-0.496	-0.398	-0.528
	(0.33)	(0.69)	(0.83)	(0.64)	(0.51)	(0.41)	(0.53)	(0.40)
POSTSOX	-0.329	-0.109	-0.735***	-0.744***	-0.334	-0.318	-0.298	-0.265
	(0.31)	(0.74)	(0.01)	(0.01)	(0.22)	(0.25)	(0.30)	(0.32)
RESTATESIZE	2.745		-1.495		-1.180		-3.942	
	(0.68)		(0.31)		(0.42)		(0.32)	
RESTATESIZE *POSTSOX	-11.497		-6.757		-4.804		-5.900	
	(0.14)		(0.35)		(0.38)		(0.38)	
CAR		-2.459**		-1.272		-1.031		-1.513*
		(0.04)		(0.21)		(0.30)		(0.07)
CAR *POSTSOX		0.14		-0.884		-0.430		0.289
		(0.93)		(0.52)		(0.75)		(0.82)
PUNRELDIR	-0.369	-0.338	0.016	0.139	-0.055	0.027	0.023	0.175
	(0.65)	(0.68)	(0.98)	(0.86)	(0.94)	(0.97)	(0.98)	(0.82)
BODSIZE	0.005	0.005	-0.023	-0.021	0.022	0.022	-0.020	-0.023
	(0.93)	(0.92)	(0.66)	(0.70)	(0.63)	(0.63)	(0.69)	(0.60)
CEOCHAIR	-0.735**	-0.695**	-0.721**	-0.612**	-0.367	-0.296	-0.111	-0.013
	(0.03)	(0.02)	(0.02)	(0.04)	(0.14)	(0.24)	(0.67)	(0.96)
ROA	-0.019***	-0.019***	-0.016***	-0.016***	-0.016***	-0.016***	-0.008	-0.010
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0,00)	(0.18)	(0.12)
Pseudo R^2	0.064	0.085	0.069	0.080	0.038	0.042	0.031	0.026
Observations	331	331	316	316	336	336	321	321

Table 3. 10. Governance variables for sample and control firms before and after the restatements

This table reports different governance variables before and two years after the restatement announcements. The sample size is 145 pairs of restating and control firms. The variables before and after the restatement are taken from proxy statements dated before the announcements and second proxy statement issued after the announcements, respectively. The variables are defined in the body of the paper. Within sample *p*-values test for the differences in sample (control) firms before and after the announcements. Sample vs. control difference *p*-values test for the difference between sample and control firms after the restatement announcements.

	Restating firm			Control firm			Sample vs. control difference *p*-value
	Before	After	Within sample *p*-value	Before	After	Within sample *p*-value	
Board size	7.97	8.13	0.17	7.97	7.84	0.30	0.17
Unrelated directors	5.46	5.72	0.04	5.43	5.56	0.24	0.48
Proportion of unrelated directors	0.67	0.70	0.01	0.67	0.70	0.01	0.91
Audit committee size	3.28	3.36	0.17	3.32	3.28	0.30	0.28
Unrelated audit committee	3.02	3.21	0.01	3.08	3.13	0.32	0.34
Proportion of unrelated audit committee	0.91	0.96	0.02	0.91	0.95	0.00	0.87
Blockholder ownership	0.11	0.13	0.01	0.14	0.14	0.47	0.19
CEO=CHAIR	0.33	0.28	0.13	0.41	0.34	0.02	0.33

Table 4. 1. Descriptive statistics for restating firms

This table reports the characteristics of 146 Canadian financial restatements during the period 1997-2006. The total number of reasons exceeds the total number of restatements because some restatements involve more than one reason. Size of restatement is the cumulative impact of restatements on net income in millions of dollars. It is scaled by the total assets in the year prior to the restatement announcement. Financial constraint status is classified as five mutually exclusive groups: not financially constrained (NFC), likely not financially constrained (LNFC), potentially financially constrained (PFC), likely financially constrained (LFC), and financially constrained (FC).

Panel A: Reason for restatement		
Reason for Restatement	**Number**	**Frequency (%)**
Cost or expense	43	26.06
Other	35	21.21
Revenue recognition	31	18.79
Securities related	23	13.94
Reclassification	9	5.45
Restructuring, assets or inventory	15	9.09
Acquisition or merger	6	3.64
Related-party transaction	2	1.21
In-process research and development	1	0.61
Total	165	100.0
Panel B: Initiating parties of the restatements		
Initiators	**Number**	**Frequency (%)**
Company	51	34.93
Auditor	13	8.90
Company and Auditor	14	9.59
Regulator	1	0.68
Other	4	2.74
Unknown	63	43.15
Total	146	100.0
Panel C: Industry distribution		
Industry and 2 digit SIC code	**Number**	**Frequency (%)**
Agriculture, forestry, and fisheries (01-09)	0	0.00
Mining (10-14)	37	25.34
Construction (15-17)	0	0.00
Manufacturing (20-39)	55	37.67
Transportation, Communications, & Utility Services (40-49)	12	8.22
Wholesale Trade (50-51)	3	2.05
Retail Trade (52-59)	8	5.48
Services (70-89)	31	21.23
Total	146	100.0

Table 4. 1. Continued

Panel D: Other characteristics of restatements		
	Mean	**Median**
Number of years restated	1.479	1
Size of restatement	-438.523	-0.405
Size of restatement/total assets	-0.031	-0.005
Panel E: Financial constraint categories		
	Number	**Frequency (%)**
Not financially constrained (NFC)	9	6.29
Likely not financially constrained (LNFC)	34	23.78
Potentially financially constrained (PFC)	83	58.04
Likely financially constrained (LFC)	9	6.29
Financially constrained (FC)	8	5.59

Table 4. 2. Summary statistics for sample and control firms

This table reports summary statistics of financial variables for restating and control firms. The variables are defined in the body of the paper. Sales, total assets, long-term debt raised and equity raised are in millions of dollars. Sales growth and Return on Assets (ROA) is in percent. Debt and equity funds raised is a dummy variable that is equal to one if the long-term debt and new equity raised during the first year restated exceeds 20% of total assets, and zero otherwise. CEOCHAIR is a dummy variable that is equal to one if the CEO is also the Board Chair and zero otherwise. CEOFOUND is a dummy variable that is equal to one if the CEO belongs to the founding family of the firm and zero otherwise. We assume that the number of analyst following is zero if the firm is not in the IBES database. Volatility is calculated as the standard deviation of stock returns over the 60 months prior to the first year restated. The reported *p*-value is for two-tailed *t*-test for the difference in means and Wilcoxon signed rank test for the difference in medians, respectively. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Mean			Median			Sample
Variable	Sample	Control	*p*-value	Sample	Control	*p*-value	Size
Sales	1250.69	1199.76	0.88	48.52	43.92	0.09*	145
Total assets	2006.42	1184.42	0.13	77.91	62.92	0.00***	145
Total long-term debt/total assets	0.127	0.117	0.52	0.063	0.026	0.38	145
Sales growth	25.12	12.24	0.07*	15.33	9.57	0.11	57
ROA	-9.937	-8.152	0.61	-1.089	0.361	0.29	145
Long-term debt raised	74.37	66.17	0.80	0.00	0.00	0.80	146
Equity raised	27.73	35.14	0.61	3.58	0.45	0.06*	146
Debt and equity funds raised	0.390	0.274	0.03**	0.00	0.00	0.03**	146
CEOCHAIR	0.384	0.377	0.91	0.00	0.00	0.91	146
CEOFOUND	0.349	0.349	1.00	0.00	0.00	1.00	146
Number of analysts following	3.77	2.12	0.00***	1.20	0.00	0.00***	146
Volatility	0.090	0.078	0.01***	0.082	0.075	0.03**	107

Table 4. 3. Summary compensation statistics for sample and control firms

This table reports summary statistics of compensation and incentive variables for restating and control firms. The variables are defined in the body of the paper and reported in thousands of dollars except for in-the-money options to salary. The variables are measured at the fiscal year-end before the first year restated. The sample size for CEO only and CFO only is less than the full sample size because CEO or CFO compensations are not disclosed in a firm's proxy statements. The reported *p*-value is for a two-tailed *t*-test for a difference in means and Wilcoxon signed rank test for the difference in medians, respectively. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Mean			Median			Sample Size
Variable	Sample	Control	*p*-value	Sample	Control	*p*-value	
Panel A: Top executives							
Salary	241.807	214.684	0.07*	188.001	185.673	0.23	146
Bonus	123.277	115.976	0.80	34.097	17.500	0.14	146
Option grant	4020.033	191.410	0.29	5.502	3.498	0.93	146
Restricted stock grant	27.236	3.438	0.06*	0.000	0.000	0.04**	146
In-the-money option	8234.193	1093.270	0.26	96.418	51.086	0.69	146
In-the-money option to salary	18.66	2.80	0.28	0.46	0.27	0.32	137
Total compensation	4477.154	663.730	0.29	299.488	268.188	0.16	146
Vested option sensitivity	35.428	11.325	0.20	1.531	1.738	0.75	146
Unvested option sensitivity	24.932	8.458	0.21	0.008	0.100	0.62	146
Total option sensitivity	108.326	24.336	0.24	3.481	4.287	0.81	146
Restricted stock sensitivity	0.158	0.021	0.07*	0.000	0.000	0.11	146
Equity sensitivity	66.450	279.152	0.23	4.267	5.817	0.46	146
Total sensitivity	174.934	303.508	0.50	13.178	17.830	0.40	146

Table 4. 3. Continued

Panel B: Chief Executive Officer (CEO) only							
Salary	364.153	314.664	0.10*	251.945	252.269	0.27	140
Bonus	259.946	286.494	0.76	49.000	4.144	0.53	140
Option grant	15114.353	408.767	0.31	3.782	0.000	0.85	140
Restricted stock grant	57.090	8.674	0.08*	0.000	0.000	0.06*	140
In-the-money option	30702.690	2733.824	0.28	76.500	15.050	0.48	140
In-the-money option to salary	64.41	5.8	0.30	0.35	0.08	0.52	126
Total compensation	15914.397	1174.075	0.30	423.650	357.375	0.39	140
Vested option sensitivity	136.939	27.358	0.23	1.960	2.243	0.82	140
Unvested option sensitivity	64.199	21.570	0.24	0.000	0.000	0.47	140
Total option sensitivity	377.918	59.405	0.27	5.419	5.563	0.65	140
Restricted stock sensitivity	0.397	0.072	0.09*	0.000	0.000	0.15	140
Equity sensitivity	216.051	135.829	0.58	9.866	13.210	0.17	140
Total sensitivity	594.366	195.305	0.24	28.292	35.926	0.13	140
Panel C: Chief Financial Officer (CFO) only							
Salary	207.429	187.066	0.16	176.125	162.135	0.13	74
Bonus	99.057	94.255	0.89	41.600	14.564	0.11	74
Option grant	2755.523	128.245	0.30	0.000	0.001	0.78	74
Restricted stock grant	11.469	8.194	0.73	0.000	0.000	0.84	74
In-the-money option	6435.232	554.541	0.29	43.230	24.500	0.67	74
In-the-money option to salary	18.99	2.07	0.29	0.18	0.18	0.64	70
Total compensation	3106.243	483.381	0.30	255.894	217.706	0.24	74
Vested option sensitivity	18.578	5.537	0.23	0.665	0.731	0.90	74
Unvested option sensitivity	30.243	5.897	0.28	0.163	0.123	0.72	74
Total option sensitivity	81.504	14.481	0.28	1.933	2.610	0.66	74
Restricted stock sensitivity	0.192	0.041	0.22	0.000	0.000	0.38	74
Equity sensitivity	18.203	2.380	0.36	0.000	0.000	0.21	74
Total sensitivity	99.899	16.902	0.29	3.184	3.121	0.95	74

Table 4. 4. Logistic regression of the likelihood of restatement

This table reports the results of the following logistic regression:
RESTATE=*f* (Total option sensitivity or Vested option sensitivity and unvested option sensitivity, Restricted stock sensitivity, Equity sensitivity, Long-term incentive plans (LTIP) payouts, Capitalraise, Volatility, CEOCHAIR, CEOFOUND, Leverage, Sales growth),
where RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero if the firm is a control firm. Total option sensitivity is the dollar change in the value of total stock options holdings (including newly granted options, vested options and unvested options) for a 1% change in stock price. Vested and unvested option sensitivity is dollar change in the value of vested and unvested options holdings for a 1% change in stock price. Equity and restricted stock sensitivity is dollar change in the value of equity and restricted stock holdings for a 1% change in stock price. Long-term incentive payout incentive is calculated as long-term incentive payout divided by total compensation. Leverage is calculated as the ratio of total Long-term debt divided by total assets at the year-end before the first year restated. Volatility is calculated as standard deviation of stock returns over 60 months prior to the first year restated. Sales growth is calculated as the compound growth rate of sales in the three years preceeding the first year restated. CEOCHAIR is a dummy variable that is equal to one if the CEO is also the Board Chair and zero otherwise. Capitalraise is a dummy variable that equals one if the long-term debt and new equity raised during the first year restated exceeds 20% of total assets, and zero otherwise. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Top Executives		CEO		CFO	
	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Panel A: Model 1						
Intercept	0.0498	0.49	-0.0736	0.63	-0.1206	0.30
Total option sensitivity	0.0048	0.64	0.0087	0.54	0.0009	0.94
Restricted stock sensitivity	0.0005	0.03**	0.0002	0.18	0.0004	0.11
Equity sensitivity	-0.000	0.04**	0.0000	0.58	0.0000	0.26
LTIP incentive	0.6345	0.81	0.6707	0.80	2.3040	0.47
Pseudo R^2	0.015		0.010		0.014	
Panel B: Model 2						
Intercept	0.1846	0.39	0.0770	0.69	-0.248	0.91
Vested option sensitivity	-0.0445	0.20	-0.0221	0.45	-0.0246	0.56
Unvested option sensitivity	0.0196	0.27	0.0134	0.40	0.0122	0.42
Restricted stock sensitivity	0.0005	0.14	0.0002	0.18	0.0004	0.21
Equity sensitivity	-0.0000	0.35	0.0000	0.53	0.0000	0.50
LTIP incentive	0.2524	0.92	0.5690	0.83	2.0567	0.59
Pseudo R^2	0.021		0.014		0.020	

Table 4. 4. Continued

Panel C: Model 3						
Intercept	-0.9981	0.06*	-0.7886	0.13	-1.3231	0.02**
Total option sensitivity	0.0122	0.59	0.0139	0.52	0.0049	0.77
Restricted stock sensitivity	0.0005	0.18	0.0001	0.19	0.0004	0.23
Equity sensitivity	-0.0000	0.44	0.0000	0.60	0.0000	0.69
LTIP incentive	6.3637	0.20	0.3173	0.91	0.8825	0.87
Capitalraise	0.4640	0.26	0.4942	0.23	0.4263	0.37
Leverage	-0.3491	0.72	-0.3564	0.72	0.4165	0.72
Volatility	9.1066	0.08*	7.3972	0.14	9.8840	0.10*
Sales growth	0.0093	0.04**	0.0103	0.03**	0.0094	0.09*
CEOCHAIR	-0.2604	0.49	-0.4059	0.29	-0.1451	0.75
CEOFOUND	-0.0498	0.89	-0.0806	0.83	0.2285	0.62
Pseudo R^2	0.078		0.071		0.067	
Panel D: Model 4						
Intercept	-0.9737	0.11	-0.7874	0.17	-1.1257	0.09*
Vested option sensitivity	0.0091	0.88	0.0164	0.71	-0.0357	0.56
Unvested option sensitivity	0.0031	0.87	0.0007	0.96	0.0176	0.52
Restricted stock sensitivity	0.0005	0.18	0.0001	0.19	0.0004	0.22
Equity sensitivity	-0.0000	0.43	0.0000	0.61	0.0000	0.22
LTIP incentive	6.2976	0.20	0.2915	0.92	0.2625	0.96
Capitalraise	0.4655	0.26	0.4968	0.23	0.4090	0.39
Leverage	-0.3451	0.72	-0.3514	0.72	0.4535	0.70
Volatility	9.0704	0.08*	7.4309	0.11	9.5669	0.11
Sales growth	0.0093	0.04**	0.0103	0.03**	0.0010	0.08*
CEOCHAIR	-0.2614	0.50	-0.4216	0.28	-0.1624	0.72
CEOFOUND	-0.0555	0.88	-0.0857	0.82	0.2429	0.59
Pseudo R^2	0.079		0.072		0.073	

Table 4. 5. Ordinal logistic regression models

This table reports the results of ordinal logistic regressions. The ordinal dependent variable is coded as two if the restatements are prompted by a regulator or auditor, one for all the other restatements, and zero for control firms. All the explanatory variables are the same as those defined in Table 4.4. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Top Executives		CEO		CFO	
	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Panel A: Model 1						
Intercept 1	-4.3837	0.00***	-4.3138	0.00***	-4.4943	0.00***
Intercept 2	-0.9440	0.07*	-0.7283	0.15	-1.3278	0.02**
Total option sensitivity	0.0162	0.55	0.0161	0.50	0.0054	0.76
Restricted stock sensitivity	0.0003	0.20	0.0001	0.25	0.0003	0.29
Equity sensitivity	-0.0000	0.47	0.0000	0.04**	0.0000	0.70
LTIP incentive	5.5077	0.24	0.3270	0.90	0.8527	0.87
Capitalraise	0.4328	0.27	0.4323	0.28	0.4744	0.30
Leverage	-0.3164	0.74	-0.3211	0.74	0.4514	0.69
Volatility	8.1378	0.09*	6.7453	0.15	10.1971	0.08*
Sales growth	0.0052	0.06*	0.0054	0.06*	0.0047	0.12
CEOCHAIR	-0.1255	0.73	-0.2924	0.43	-0.0079	0.99
CEOFOUND	-0.0327	0.93	-0.1106	0.76	0.2047	0.64
Pseudo R^2	0.052		0.062		0.047	
Panel B: Model 2						
Intercept 1	-4.3722	0.00***	-4.2737	0.00***	-4.3118	0.00***
Intercept 2	-0.9314	0.11	-0.6880	0.21	-1.1353	0.08*
Vested option sensitivity	0.0163	0.77	0.0138	0.75	-0.0360	0.54
Unvested option sensitivity	0.0013	0.95	0.0013	0.93	0.0208	0.62
Restricted stock sensitivity	0.0003	0.20	0.0001	0.25	0.0003	0.28
Equity sensitivity	0.0000	0.46	0.0000	0.04**	0.0000	0.67
LTIP incentive	5.4508	0.24	0.2826	0.92	0.2211	0.97
Capitalraise	0.4335	0.28	0.4341	0.27	0.4693	0.31
Leverage	-0.3160	0.74	-0.3390	0.72	0.4639	0.68
Volatility	8.1421	0.09*	6.7097	0.15	9.8899	0.09*
Sales growth	0.0052	0.06*	0.0054	0.06*	0.0049	0.11
CEOCHAIR	-0.1320	0.72	-0.2993	0.42	-0.0134	0.98
CEOFOUND	-0.0347	0.92	-0.1207	0.74	0.2117	0.63
Pseudo R^2	0.052		0.062		0.053	

Table 4. 6. The impact of option sensitivity on size of restatements

This table reports the regression results. The dependent variable is the absolute value of the cumulative effect of restatements on net income scaled by total assets in the year prior to the year of restatement announcements. Total option sensitivity is the dollar change in the value of total stock options holdings for a 1% change in stock price. Vested and unvested option sensitivity is dollar change in the value of vested and unvested options holdings for a 1% change in stock price. Equity and restricted stock sensitivity is dollar change in the value of equity and restricted stock holdings for a 1% change in stock price. Long-term incentive payout incentive is calculated as long-term incentive payout divided by total compensation. Leverage is calculated as the ratio of total Long-term debt divided by total assets at the year-end before the first year restated. Volatility is calculated as standard deviation of stock returns over 60 months prior to the first year restated. Sales growth is calculated as the compound growth rate of sales in the three years preceeding the first year restated. ***, ** and * indicate significance at 0.01, 0.05 and 0.10 levels, respectively.

	Top Executives		CEO		CFO	
	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Intercept	0.0102	0.73	0.0105	0.72	-0.0009	0.91
Total option sensitivity	0.0005	0.55	0.0006	0.51	0.0000	0.85
Restricted stock sensitivity	0.0000	0.92	0.0000	0.87	0.0000	0.85
Equity sensitivity	0.0000	0.94	0.0000	0.75	0.0000	0.00***
LTIP incentive	-0.0284	0.92	-0.0247	0.88	-0.0110	0.88
Leverage	-0.0525	0.39	-0.0528	0.40	0.0088	0.57
Volatility	0.0587	0.84	0.0467	0.87	0.0663	0.40
Sales growth	0.0003	0.06*	0.0003	0.05**	0.0000	0.80
Adjusted R^2	0.03		0.04		0.04	

Table 4. 7. Option exercises by executives

This table reports summary statistics of executive option exercises during the first year restated and regression results for restating and control firms. In-the-money options is the sum of the value of exercisable options and unexercisable options. RESTATE is a dummy variable that is equal to one if the firm is a restating firm and zero if the firm is a control firm. ***, ** and * indicate significance at the 0.01, 0.05 and 0.10 levels, respectively.

	Mean			Median		
Variable	Sample	Control	*p*-value	Sample	Control	*p*-value
Panel A: Top executives						
Value of Options exercises	1054092.4	227568.8	0.13	0	0	0.17
No of exercised options/vested options	0.91	0.09	0.24	0	0	0.08*
Panel B: Chief Executive Officer (CEO) only						
Value of Options exercises	3497017.7	269843.4	0.10*	0	0	0.49
No of exercised options/vested options	0.17	0.09	0.06*	0	0	0.22
Panel C: Chief Financial Officer (CFO) only						
Value of Options exercises	972550.5	132394.9	0.27	0	0	0.32
No of exercised options/vested options	1.61	0.11	0.27	0	0	0.10*
Panel D: regression with options exercises						
	Top executives		CEO		CFO	
	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
Intercept	-369116	0.74	-2261702	0.15	368603	0.29
Ln(Asset)	16912	0.82	113903	0.17	-25542	0.23
Salary	0.468	0.77	0.649	0.72	0.741	0.02**
Bonus	-1.313	0.27	-2.559	0.17	0.211	0.46
In-the-money option	0.308	0.00***	0.356	0.00***	0.131	0.00***
RESTATE	116562	0.41	505830	0.06*	20184	0.67
Size of Restatement	3427	0.00***	16315	0.00***	-24.60	0.78
Adjusted R^2	0.94		0.95		0.99	
Observations	292		286		198	

APPENDIX

Appendix 2.1 Categories for the reasons given for the financial restatements

This table provides the categorization used by the GAO (2002, 2006) of the reasons given for financial restatements.

Category	Description
Cost or expense	Restatements due to improper accounting for costs or expenses. This category generally includes a company understating or overstating costs or expenses, improperly classifying expenses, or any other number of mistakes or improprieties that led to misreported costs. It also includes improper treatment of expenses related to tax liabilities and tax reserves; improper treatment of financing arrangements, such as leases, when a related asset was improperly capitalized or expensed as part of the financing arrangement; and improperly reserved litigation restatements.
Revenue recognition	Restatements due to improper revenue accounting. This category includes instances in which: revenue was improperly recognized, questionable revenues were recognized, or any number of other mistakes or improprieties that led to misreported revenue. Also included are transactions with non-related parties that artificially inflate volume and revenues, through the simultaneous purchase and sale of products between colluding companies that are known as round-trip transactions.
Securities related	Restatements due to improper accounting for derivatives, warrants, stock options and other convertible securities.
Restructuring, assets or inventory	Restatements due to asset impairment, errors relating to accounting treatment of investments, timing and amount of asset write-downs, goodwill and other intangibles, restructuring activity and inventory valuation, and inventory quantity issues.
Acquisition or merger	Restatements due to improper accounting for or a complete lack of accounting for acquisitions or mergers. These include instances in which the wrong accounting method was used, or losses or gains related to the acquisition were understated or overstated.
Reclassification	Restatements due to improperly classified financial statement items, i.e., current liabilities classified as long-term debt on the balance sheet, or cash flows from operating activities classified as cash flows from financing activities on the statement of cash flows.
Related-party transaction	Restatements due to inadequate disclosure or improper accounting of revenues, expenses, debts or assets involving transactions or relationships with related parties.
In-process research and development	Restatements resulting from instances in which improper accounting methodologies were used to value in-process research and development at the time of an acquisition.
Other	Any restatement not covered by the listed categories, such as: restatements due to inadequate loan-loss reserves, delinquent loans, loan write-offs, or other allowances for doubtful accounts or accounting estimates; and restatements due to fraud or accounting errors that were left unspecified.

Appendix 2.2 Spread decomposition and probability of informed

A2.2.1 Madhavan, Richardson and Roomans (1997) or MRR Model

The MRR model uses an approach to decompose the spread that assumes a constant order size. The transaction price changes, Δp_t, are given by

$$\Delta p_t = \alpha + (\phi + \theta) I_t - (\phi + \rho\theta) I_{t-1} + \mu_t \quad \text{(A2.1)}$$

where α is the constant drift, ϕ represents the transitory effect of order flow on prices, and θ represents the degree of information asymmetry or the permanent effect of order flow on prices. ρ is the first-order autocorrelation of the trade indicator variable I_t. μ_t is a composite error term including both the innovations in beliefs due to new public information and the effect of price-rounding errors.

Trade direction is inferred using the Lee and Ready (1991) algorithm with a five second lag. Specifically, the algorithm classifies a trade as buyer (seller) initiated if the trade price is above (below) the prevailing mid-quote. If the trade occurs exactly at the midpoint of the quote, a "tick test" classifies the trade as buyer (seller) initiated if the trade price is above (below) the previous price. If the trade takes place at an unchanged price corresponding to the current spread midpoint, then its price is compared successively to the next most recent trade until the trade is classified.

The generalized method of moments (GMM) procedure is used to estimate the model parameters (A2.1). The following moment conditions implied by the model exactly identify the parameter vector (ϕ, θ, λ, ρ) and the constant α.

$$E\begin{pmatrix} I_t I_{t-1} - I_t^2 \rho \\ |I_t| - (1-\lambda) \\ \Delta p_t - \alpha \\ (\Delta p_t - \alpha) I_t \\ (\Delta p_t - \alpha) I_{t-1} \end{pmatrix} = 0 \quad \text{(A2.2)}$$

The first moment condition defines the autocorrelation in order flow, the second condition defines the probability of a transaction executed within the quoted bid-ask spread, the third

condition defines the expectation of a zero residual mean, and the last two conditions are the OLS normal equations. In GMM estimation, the parameter vector is chosen such that the sample moments most closely approximate the population moments. Hansen (1982) demonstrates that the GMM estimates of the parameters are consistent and asymptotically normally distributed. The Newey-West procedure is used to obtain the heteroskedastic consistent covariance matrix.

The order processing component ϕ and adverse selection component θ are estimated in dollar terms for each restatement announcement. The implied spread is $2(\phi + \theta)$, and the proportional averse selection and order processing components are given by $\theta/(\phi + \theta)$ and $\phi/(\phi + \theta)$, respectively.

A2.2.2 Glosten and Harris (1988) or GH Model

In contrast to the MRR model, the Glosten and Harris (1988) or GH model accounts for order size when decomposing spreads into a permanent (or adverse selection) component C_0 and a transitory (or order processing) component Z_0. Both components are positive functions of the number of shares traded in transaction *t* or V_t. Price changes, Δp_t, are denoted as

$$\Delta p_t = c_0(I_t - I_{t-1}) + c_1 V_t (I_t - I_{t-1}) + z_0 I_t + z_1 V_t I_t + \varepsilon_t \qquad \text{(A2.3)}$$

where I_t and I_{t-1} are the trade indicator variables (+1 for a buyer-initiated trade and -1 for a seller-initiated trade). The order processing component is $C_0 = 2(c_0 + c_1 V_t)$ and the adverse selection component is $Z_0 = 2(z_0 + z_1 V_t)$.

The parameters c_0, c_1, z_0 and z_1 are estimated using ordinary least squares for each restatement in the sample. The implied spread is $S_i = 2(c_o + c_1 \overline{V_i}) + 2(z_0 + z_1 \overline{V})$, where $\overline{V_i}$ is the average trade size per restatement announcement. The ratios of the adverse selection and order processing components over the total spread as percentages are given by Z_i/S_i, and C_i/S_i, respectively.

A2.2.3 Probability of Informed Trade (PIN)

The Easley *et al.* (1996) or EKOP model assumes the existence of three types of players: informed traders, uninformed traders, and competitive market makers. At the beginning of the

trading day, an information event may occur with probability α. If an information event occurs, the probability of bad news is δ and the probability of good news is $1-\delta$. Informed traders only trade when an information event occurs (i.e., buying on good news and selling on bad news). Buy and sell orders from informed traders follow the same Poisson process with arrival rate μ. Buy and sell orders from uninformed traders also follow a Poisson process with the same arrival rate ε and are independent of the information event. Thus, arrival rates for buy and sell orders are $\varepsilon+\mu$, and ε, respectively, for good-news days; are ε, and $\varepsilon+\mu$, respectively, for bad-news days, and ε for no-news days.

The Lee and Ready (1991) algorithm is used to determine the number of buys and sells on each day for each restatement. The probabilities of no-event, bad-news, and good-news days are $1-\alpha$, $\alpha\delta$, and $\alpha(1-\delta)$, respectively. Thus, the likelihood function is:

$$\begin{aligned} L((B,S)|\theta) = &(1-\alpha)e^{-\varepsilon}\frac{\varepsilon^B}{B!}e^{-\varepsilon}\frac{\varepsilon^S}{S!} + \alpha\delta e^{-\varepsilon}\frac{\varepsilon^B}{B!}e^{-(\mu+\varepsilon)}\frac{(\mu+\varepsilon)^S}{S!} \\ &+ \alpha(1-\delta)e^{-(\mu+\varepsilon)}\frac{(\mu+\varepsilon)^B}{B!}e^{-\varepsilon}\frac{\varepsilon^S}{S!} \end{aligned} \tag{A2.4}$$

where B and S are the total number of buys and sells for the day, respectively, and the parameter vector is $\theta = (\alpha, \delta, \varepsilon, \mu)$. The days are assumed to be independent, so that the likelihood function over I days is the product of daily likelihoods as follows:

$$L(M|\theta) = \prod_{i=1}^{I} L((B_i, S_i|\theta) \tag{A2.5}$$

The parameter vector θ given the data set $M = [(B_1, S_1),\ldots.(B_I, S_I)]$ is estimated by maximizing the likelihood function (A2.5).

The probability of informed trade (PIN) is given by:

$$PIN = \alpha\mu/(\alpha\mu + 2\varepsilon) \tag{A2.6}$$

The probability parameters α and δ are constrained to (0,1) by a logit transformation, and ε and μ are restricted to $(0, \infty)$ by a logarithmic transformation. To ensure a global maximum, different

starting points are used. Standard errors of the parameter estimates are calculated using the delta method.

Appendix 4.1 Categorization of Financial constraints by Hadlock and Piere (2010)

Following Hadlock and Piere (2010) and Kaplan and Zingles (1997), we collect information on financial constraints by reading annual reports and financial statements filed with SEDAR. In particular, we read annual letters to shareholders and the management discussion and analysis section for both restating firms and control firms in the fiscal year before the first year restated. We also perform keyword searches of the annual reports and/or financial statements by using "financing", "finance", "investing", "invest", "capital", "liquid", "liquidity", "covenant", "amend", "waive", "violate", and "credit". We extract every statement that is related to the firm's ability to raise funds or finance its current or future operations. For many firms, we have multiple statements. Similar to Hadlock and Piere (2010), we assign each statement to one of the five categories from 1 to 5, where lower (higher) numbers indicates a lack of (presence) of financial constraints.

The statements that indicate that a firm has excess or more than sufficient liquidity to fund its capital needs are assigned to category 1. Statements using the word "strong" or a similar adjective when describing a firm's financial position are also assigned to this category. Examples of statements that are assigned to category 1 include: "The company is well positioned to continue its growth, with a strong balance sheet and significant unused debt capacity and credit facilities," and "management believes that the Company's liquid assets are more than sufficient to fund planned operating and project development and sustaining capital expenditures and discharge liabilities as they come due". We assign the statements to category 2 which indicate a firm has adequate or sufficient liquidity to fund its needs. The main difference between category 1 and category 2 is the strength of the language. Examples of statements that are assigned to category 2 include: "The Company believes that it will be able to generate sufficient cash flow to meet its current and future working capital, capital expenditure and debt obligation requirements," and "The Company has adequate resources to finance operating needs over the business cycle as well as its growth and strategic objectives."

The statements that are opaque and therefore difficult to classify into other categories are assigned to category 3. Category 3 also includes statements that are soft warnings regarding a firm's future liquid position if certain scenarios were to happen. The feature of category 3 is that the statements not only do not indicate any financial strength but also do not indicate any current liquidity problems. Examples of statements that are assigned to category 3 include: "Although the Company has been successful in obtaining financing to date, there can be no assurance that the Company will be able to obtain adequate financing in the future or that the terms of financing will be favorable," and "In order to achieve its long term development and commercialization strategy, the Corporation will need to raise additional capital through the issuance of shares or collaboration agreements or partnerships that would allow the Corporation to finance its activities. Nothing guarantees that additional funds will be available or that they may be acquired according to acceptable terms and conditions, allowing the Corporation to successfully market its products."

The statements that indicate current some liquidity problem such as having difficulty in obtaining finance, but with no direct direction that these problems have affected the investment decisions are assigned to category 4. Examples of statements coded as category 4 include: "We may incur substantial losses in the future that could make financing our operations and business strategy more difficult," and "During the year, however, as prospects for economic growth in a number of the major global economies declined, metal inventories rose, mines began to close and capital available for lending for the development of new mine projects tightened. Consequently the Company decided to defer financing the development of the Magellan Project until these factors improved."

The statements that are assigned to category 5 indicate clear financial problems or constraints such as in violation of debt covenants, has been cut out of usual source of capital, is renegotiating debt payments, is forced to reduce investment because of liquidity problems. Example of statements coded as 5 include: "Under the terms of the company's banking agreement, the company must meet certain stated financial covenants. As at January 31, 2002, the company was

not in compliance with the cash coverage covenant. The company is currently re-negotiating its credit facilities with the bank as well as looking at alternative sources of financing."

Now we aggregate these five categories to a single overall financial constraint group. The five mutually exclusive groups are: not financially constrained (NFC), likely not financially constrained (LNFC), potentially financially constrained (PFC), likely financially constrained (LFC), and financially constrained (FC). A firm belongs to NFC group if it has at least one statement coded as a 1 and no statement coded below a 2. These are firms that indicate more than sufficient liquidity and no evidence to the contrary. A firm belongs to LNFC group if its statements are only coded as 2s. These are firms that indicate sufficient liquidity with no statements of excessive liquidity and no statements indicating any weakness. A firm with mixed information about their constraint status belongs to the PFC group. An example is a firm that has a statement coded as 2 or better (indicating financial strength), but also has a statement coded as 3 or worse (indicating possible financial weakness). The firm also belongs to the PFC group if all of its statements are coded as 3. A firm belongs to the LFC group if at least one statement is coded as 4, no statement is coded as 5, and no statement is coded better than 3. These are firms that indicate some current liquidity problems, with no offsetting positive statement and no statement that is so severe that they are placed into the lowest (FC) category. Finally, a firm belongs to the FC group if at least one statement is coded as 5 and no other statement is coded better than 3. These are firms that clearly indicate the presence of constraints with no strong offsetting positive disclosures.